RAILROAD GAZETTE

FRIDAY, JANUARY 25, 1901.

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Contributions

Block and Interlocking Signals in England.

London, Jan. 14, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

You ask me to give you an idea of the latest phases in the evolution of signaling in the Old Country. It may perhaps be appropriate to preface what I have to say with the statement that it is well-nigh impossible to make the average British railroad man understand how thoroughly and independently you Americans have taken up what was a new science to most of you, say, eighteen years ago.

There has been so little change in British practice of late years, that I feel there is little to tell. Some of the movements have been distinctly of a retrograde nature. For instance, on many railroads the "spread" system of arranging signals is used for both converging and diverging tracks, and there have of late been a considerable number of cases of drivers taking the wrong signal in consequence. I hold that the spread system is not suitable where there are many tracks. You must give us credit for seeing you well grounded in the right principles.

For some time there has been a small installation of the Westinghouse electro-pneumatic system on the Great Eastern, and now my old line, the Lancashire & Yorkshire, is to put down a fairly large Westinghouse signal box at Bolton Junction, a very warm corner.

The "low pressure" all-air system is, I understand, to be tried by an English railroad company. From what I can see of the drawings, this apparatus has been considerably altered in design since I inspected Mr. Dodgson's first machine erected at Buffalo.

Mr. Webb told us at the Institution of Civil Engineers the other night that he and Mr. Thompson were designing a 300-lever all electric plant for Crewe Yard, after having carried out extensive experiments for the London & Northwestern.* I had the honor, on that occasion, of explaining the high state of perfection attained by the designers of Swissvale origin, in connection with the introduction of power signaling, etc.

You possibly know that Mr. Sykes is now engaged in equipping one of the Glasgow Terminals with an electro-mechanical scheme. The switch points are worked by the usual levers, but all the signals are worked by electro-motors controlled from a small interlocked apparatus fitted above the point levers. The interlocking between the electric signal frame and the point levers, is accomplished through the medium of route levers, placed in amongst the point levers. The point levers release a certain route lever to work to one of three positions. This in turn releases certain levers in the electric signal frame. The power is obtained from a storage battery. All the facing points are fitted with electric detectors, which also govern the route levers.

The track circuit is not making much headway at present in England, and our officers are even now not thoroughly aware of the advantages of track circuit protection, and of the thoroughly practical way in which you employ it. The Great Northern has, however, been steadily plodding away at experiments with a few track circuits during the last year or two, and now appears to be convinced as to its good points, and is extending it.

Our only difficulty with the track circuit is the fact, which I have mentioned before, that wooden center wheels are generally used under passenger trains; but once our people understand the advantages of the system, I anticipate little trouble in getting the wheels fitted with connecting strips. For the present we shall have to content ourselves with "overlapping," and use of engine wheels only.

I have received a letter from Mr. Acland, of the East Indian Railway, Calcutta, in which he informs me that they are just about to open their first length of lock and block working. The Indian railroads have used Winter's block gear to a considerable extent, and the same system is used in Australia, in New Zealand and in South America. The Webb & Thompson Electric staff and Tyer's Tablet systems are very generally employed on the Colonial single track lines. In Australia they have a system by which the trainmen obtain the electrical staff at intermediate passing sidings, where no station men are employed.

With regard to telegraphs, the single needle is still in general use for railroad purposes over here, and there can be no doubt that it is a very simple and efficient telegraph where a large number of offices are on one circuit, as is often the case. On the other hand, some of the Colonial railroads use the sounder with low resistance relays, and line battery at both ends. In the Colonies, however, an audible telegraph apparatus is almost a necessity, as the operator is often the Station Master and ticket clerk, etc., all rolled into one.

On the South Western Railway the Telautograph is to be installed for use as a train describer for inbound trains to Waterloo. With this there will be a written record of all such messages in the actual hand of the sender.

ARTHUR H. JOHNSON.

*Described in the *Railroad Gazette*, January 11.

The Water Jet on Engine Drivers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Railroad Gazette* of Jan. 11 appeared a description of a water jet apparatus for wetting driving wheel flanges and rails where heavy engines are used on sharp curves. An officer of the road has expressed, in sense, the opinion that this device is indispensable for the work these engines have to do. I recognize the general understanding that a driving wheel tire may readily slip on a slightly wet or pasty rail, and that it will maintain at least a high percentage of its total adhesive possibilities on a thoroughly washed wet rail; but nevertheless the tendency to slip is always greater on a wet rail than on one that is entirely dry and clean.

In regard to the lessening of the wear of rails and flanges it is doubtless safe to say that such loss will be decreased by drenching the parts with water. This has been demonstrated, long since, on both elevated and street railroads, which are strong illustrations of the most abrupt curvature that it is necessary to use in any kind of railroad traffic. It is just as well to consider, however, that when this expedient was resorted to at such places, where perhaps the application of it to steam railroads was fathered, the water was usually supplied from an ordinary sprinkling hose set at the proper angle to hit a particularly troublesome curve, or from an ordinary watering pot in the hands of a laborer who traveled the track on foot. This use of water involved very slight comparative cost when the economy of power, flange and tire wear is considered. When, however, water is used from a locomotive boiler after being heated high above the ordinary atmospheric boiling point by the expensive heating operations of the locomotive, and streams of it are run constantly upon the rail, it becomes a question whether the addition to the fuel accounts thus entailed would not go far toward overtaking that part of the cost of damaged rails and flanges, which it is intended to thus avert. I recognize this method as a "very present help in time of trouble," but consider that it would require extreme conditions in the relation of wheel and rail to justify the use of water, from a locomotive boiler, for this purpose. In a wind-blown district where dust abounds an impossible amount of water would be required to keep the wheel and rail clean. In cold weather the difficulties in such, or any other, place would be greatly increased. There may be local conditions that warrant this additional taxation of the boiler capacity, but they cannot be cited as a condition for average mountain work.

R. F. H.

Why Couplers Fail.

This is the title of a topic for discussion at a recent meeting of the Pacific Coast Railroad Club. In discussing it Mr. W. E. Fowler said (in part):

We have a reminder every day, that there are no men between the cars making the couplings now, as the damage to draft rigging by switching has increased quite 50 per cent. since the general adoption of the M. C. B. coupler. It was confidently expected that with the banishment of the link and pin, the number of coupler failures would be tremendously decreased. They have decreased to some extent, but as long as cars are kicked together with both coupler knuckles closed, and the buffing face of each comes in collision, we cannot realize anything like the reduction in coupler failures that we have a right to expect. It perhaps was not in the mind of the framer of the question, but the foregoing paragraphs must be considered as a partial explanation of "Why Couplers Fail." Let any doubter stand in a freight yard some evening, when the leaving time of an important train is very close, or, as is sometimes the case in these days of heavy business, already past. It is safe to say that 90 per cent. of coupler breakages are originated by switching.

Another cause for coupler failures is the excessive shocks received by cars in trains handled by two engines, especially in cases where the engines are rated up to or beyond their capacity. It might be supposed that, with the coming of the M. C. B. coupler, the slack had been completely eliminated. That this is not the case, however, is apparent to any person riding in the caboose. The compression limit for a 6 in. x 6 in. draw-bar spring is 1¾ in.; for a 6 in. x 8 in., 2¼ in., and the force or weight necessary to exhaust it about 19,000 lbs. It is a well-known fact that the capacity of these springs is far below the shocks to which they are subjected, under even ordinary conditions, and when, with an excessively heavy train, or a bad rail, or both (possibly combined with a bad temper, because the work requested on the roundhouse order book was not done), the engineer makes an effort to start his train; he does not succeed the first time, but he is going to do it next time. He takes the slack, and how much is it? At 4½ in. per car (and this is sometimes increased 50 per cent.), imagine the effect on the cars. The pull of the locomotive, increased by the momentum caused by the slack, is tremendous at the rear of even a twenty-car train, and, as a consequence, coupler shanks of M. C. B. standard dimensions are broken by the shock, knuckles are broken across the pulling face, locks broken and lugs of couplers pulled off, showing not only that the spring capacity is by no means equal to the demands upon it, but—as breakage under these conditions is not confined to any one part of the coupler—that there is pressing need for reducing the strains upon it, strengthening it in all its parts, or providing more spring capacity to absorb the shock, without costly change of construction.

As far back as 1895, on the Southern Pacific System, under the direction of Mr. H. J. Small, Superintendent M. P., a regular monthly report of about twenty varieties of the M. C. B. coupler—most in service on the Southern Pacific System—was instituted. This record, which time and experience has since shown to be very valuable and remarkably accurate, recorded the actual number of each coupler in service, the actual number of failures, and the particular part that failed, reports being sent in from every inspection point on the Southern Pacific System. These reports, coming from a system large and thoroughly organized, were rendered still more valuable by being continued to within a short time ago, so that accidents of temperature or season, a bad run of metal, carelessness in manufacture or improper assembling, could not affect the value of the final comparison. The aim was, of course, to determine what were the inherent weaknesses and defects of each particular coupler, and it is surprising to note with what regularity the percentage of failures runs through the records of all these years.

The value of the record, indicating what the percentage of failures was for each kind of coupler, was very great. But this was not to be the only or greatest benefit to be derived from it. This, however, will be referred to later on. It was soon discovered that there is a wide variation in the number of failures of the same parts in different couplers.

Some fail on account of their many working parts, these being dependent on each other, and success depending upon a nice and exact adjustment. This is necessarily an impossibility in freight car service, and the complicated affairs soon adorn the scrap piles. Some couplers are notoriously weak in the lock. On some Western roads the proportion of failed locks from one variety of coupler being largely in excess of any and all others. Some knuckles break more frequently; some at the lugs where the coupling pin is provided for; some at the tail end of the knuckle; some across the pivot pin hole; some through the main part of the knuckle, and some, but very few comparatively, fail on account of being worn out. Some coupler failures are due, but rarely, to snow and ice and cinders getting in the lock chamber or housing, and freezing fast or clogging the lock mechanism, so that it cannot be operated. Some uncoupling failures are due to the wearing away of the lock, at its point of contact with the knuckle; some to the wearing away of the lock and its enclosing or opposing seat in the housing; some to the bending or burring of the lock so that it cannot be raised, or so that the knuckle thereby opens so far as to allow uncoupling; some to the creeping or automatic raising of the lock—this is, however, quite rare—and some to the wrong adjustment of the uncoupling device, which thereby uncouples at the wrong time or does not uncouple at all. A few coupler failures are due to the wearing of all the moving parts that make up the coupler, so that the amount of lost motion, or play, produced allows the knuckles to pass on curves, and a break-in-two is the result. This class of failure is not confined to freight cars. It has developed within the past year on passenger cars also, but a means of check and discovery has been provided.

Many failures are due to the reckless use of the emergency feature of the air-brake, especially in long trains, frequently when making stops for water tanks and coal chutes, as the scrap bins at such places will show.

The Southern Pacific System of reports and record which has been already referred to, valuable as it was in determining positively what were the actual failures,

and the consequent cost of maintenance of each variety of coupler, was not at the end of its service when this was done. The record showed that all couplers had a weak point in either construction or operation. Very few of these weaknesses were found in the same part of different couplers—in the same proportion at least. With all the data furnished by the Southern Pacific reports and records at hand, why not make a permanent and practical use of them. As there were points of excellence in several of the couplers, whose history had been kept, the thing to do was to design a composite coupler, one whose working parts should be so balanced and adjusted that each would be amply strong to stand its part of the shocks and strains to which couplers are subjected in service. A coupler of the fewest possible number of working parts, and those reasonable in cost and easy of manufacture, easily assembled, and easy to take down and repair. A coupler made of such material, as experience and service had shown to be most economical, and of the greatest strength. The work of improvement and modification is still in progress, but even at this early date, the results are extremely gratifying to the originators of the idea, and the failure percentages are being steadily lowered as the improved coupler comes more into use. To offset these conditions, however, the heavy engine and the long train appear, and time and service must show whether the present composite coupler is as near perfect as possible, or whether the evolution must still go on.

Hot Driving Boxes on Locomotives.*

I advocate a cast-iron or cast-steel driving box with a phosphor bronze brass. The brass should be pressed in at from five to six tons pressure and should be plugged with two brass plugs from the top of the box, one on each side. It is a mistake to put a driving brass in a box at a higher pressure than will insure them staying tight. Five or six tons will, with the aid of the brass plugs, keep them tight. A brass put in at 15 or 20 tons, if it heats, will come in very hard on the sides of the journal and very much aggravate the heated condition. The driving journals should be turned true if worn out of round or taper. Then the brasses should be carefully fitted to the journals, and when so fitted the boxes should rock easily with one hand forward and back on the journals. The old practice of boring a driving box out above the center line and then springing the box in order to let the lips of the brass snap over the journal is a mistake.

I believe in the side oil holes. The first ones tried here came on to the journal only ¾ in. above the center line. These were altogether too far down, as they would fill with fine particles of waste. These holes are now being put in so they come on to the journal 2½ in. above the center line of the journal. We are now using one on each side in addition to the center hole, with very good results.

The oil cellars should fit tight in order to prevent the driving boxes from closing on the bottom. I think an oil cellar with an opening on the inside end so the cellar can be packed without removing it, is a good thing. The oil cellar should fit up close to the journal to prevent dust getting in and waste getting out. The top of the box should have a reasonable amount of waste, not too much, to hold and feed oil down on to the journal. It is a splendid idea to cover this top packing with a piece of galvanized or sheet iron just laid in on top of the packing. This waste on the top of the box should receive the same care and attention as the waste in the cellar.

The cellar should be carefully packed, the waste should be bunched well together and put in at right angles to the journal. Each separate bunch should reach from the bottom of the cellar up to the journal, then the fag ends on either side should be well tucked under each side, to prevent the rolling journal from moving and pulling the waste up on the back side of the journal. It has been demonstrated to us recently that freight and passenger car journals actually carry particles of waste up under the brasses. They call them waste grabs, and I am convinced that many hot boxes on cars are produced by these waste grabs, and there is no question in my mind but that small particles of waste are carried up under driving brass. When the side oil holes in the driving brass were first put very low down I have seen the holes, as well as the grooves, filled with fine particles of waste. All this argues for more care in putting the waste in the driving cellars.

In order to get satisfactory results, this packing must be kept in the proper condition as to the position and the proper amount of oil. The only way this can be accomplished is by systematic attention. On 10-wheel engines we find the most trouble with the back boxes, the next with main boxes, and the least with the front boxes. On account of this the packing is examined every 510 miles in the back cellars, every 1,020 miles in the main cellars and every 1,530 miles in the front cellars. This examination does not mean to repack the cellars with new waste. It only means that the condition of the waste is kept the same, and anything is done that is necessary to keep the waste in proper position in the cellar, and also it is seen that the proper proportion of oil is present.

I consider constant systematic care of the packing of more importance in preventing hot boxes than any other half dozen remedies I know of. What is true of driving journals is also true of car journals. It is not a question of more oil and more waste, but more care. It is not enough that you make a careful blue print and write a long bulletin as to how driving boxes should be packed and cared for. But these instructions must be followed up very day. It is not a question of what men are instructed to do. The all important proposition is what they are doing. It costs little effort to write instructions, but it costs a good deal of effort to follow these instructions up and to know that they are carried out. As a means to an end I am advocating better discipline, and better discipline means more co-operation on the part of the railroad employees. The railroad company that can get the most care and co-operation from its employees will have the fewest number of hot boxes. I am familiar with a division of railroad where, with 75 engines and a total of 623,554 engine miles during a period of two months, there was not one engine delay from hot driving boxes.

*From a paper before the Western Railway Club by M. E. Wells, General Foreman of the Burlington & Missouri River.

Ten-Wheel Passenger Locomotives—Atchison, Topeka & Santa Fe Class B-15.

[WITH AN INSET.]

The latest passenger locomotives of the Santa Fe, referred to last week as Class B-15, in connection with a record of work done in the mountains by Classes B-13 and B-14, are here described. An inset sheet and other illustrations, among which is a half-tone of Eng. 533, show the design. As stated in the preceding article, there are now 20 of these locomotives at work and 10 more are being built, for early delivery, by the International Power Company, Providence, R. I. These engines meet the need for power that has enough flexibility to allow ready transfer from heavy fast passenger work, in certain districts, to fast freight work, as for example on fruit or stock runs, of which there are many on this system.

The working steam pressure is 200 lbs. and the cylinders, 20 x 28 in., are ample for the weight, 125,930 lbs., on the 67-in. driving wheels. The estimated traction, about 28,400 lbs., assuming a mean effective pressure of 85 per cent. of boiler pressure, is close to the adhesion, if the coefficient be taken as the mean between one-fourth and one-fifth of the weight on driving wheels. The full tractive force is available without undue tendency to slip. The total grate area is 29.8 sq. ft., and the total heating surface 2,329 sq. ft., a ratio of 1 to 78. The fire-box is 39¾ in. x 108 in., and has a depth of 73 9-16 in. at front and 61 in. at back.

The boiler is of the extended wagon top type with sloping crown sheet and sloping grates, a brick arch on water tubes being used. The boiler shell above the crown sheet also slopes backward to the boiler head. The fire-box stays are radial, except a single row of sling stays, which are attached to T irons, and are used as the front row of crown stays. The radial crown stays are alternately riveted over or set with nuts against the under side of the crown sheet, the crown sheet being faced to receive the nuts and no gasket used, as shown in boiler details. It may be noted in the horizontal seam work that some of the radial stays pass through the lap joints above and to right and left of the upper corners of the fire-box and do duty with the rivets of those seams.

The frames, centers of main driving wheels, mud ring and many detail parts are cast steel. The front and back driving wheel centers are cast iron. The engine truck is of the three-point suspension type and has 30-in. wheels. It is not greatly unlike the truck of the Lehigh Valley heavy passenger engines illustrated in the *Railroad Gazette*, Dec. 28, 1900, and it may be of interest to compare the drawings of the center castings and note the different methods of obtaining the desirable result that this form of suspension gives. These engines have been at work for some months on very exacting work, and the reports agree that they are easy riding, very steady in taking curves, and that they hold the rail well when forced to high tractive effort. The latter result is to be expected from the relation of power and adhesive weight previously referred to.

The general features of the engines are so fully illustrated as to require little reference to them in detail. Attention is invited, however, to the cylinder and saddle castings, the frames and expansion pads, the spring equalization and the valve gear. The latter is shown in plan, elevation, and sections on the inset sheet. The valves are piston, cast in two pieces; have three ½-in. snap rings on each head; are 10½ in. in diameter, and have inside admission. Information as to how they are set appears with the indicator diagrams. It may be seen from the illustrations that rocker arms with both arms turned down are used, and that the motion of the valve is the direct motion of the eccentric. The drawings show a connecting bar from the rocker arm to a small fulcrum bar that is bracketed to the main frame just back of the No. 1 pedestal jaws, and on the top rail of the frame. The radius of the rocker arm and fulcrum bar is 11 in. in each instance. From the bracketed fulcrum bar the motion is transmitted by a direct valve rod, which carries a small guide block working in a guide casting provided and placed as shown. The eccentric rods, with this arrangement, are open.

Some indicator cards are here shown as taken from engine No. 526 while working out of Raton, N. Mex., over a part of the road which was shown in profile in our issue of last week. Five of these cards are reproduced, and with them will be found sufficient information to outline the conditions under which they were taken. Remembering the diameter of the driving wheels, 67 in., it may be noted from the speed and cut-off of the various cards that the engine was being worked hard when the cards were taken, and that the purpose was chiefly that of testing acceleration. Card No. 2, especially, was taken under such conditions, the speed being 31 miles an hour, the cut-off 16 in. and the indicated horse-power 1,434. In card No. 5, where the speed was 52 miles an hour and the cut-off 7½ in., the back pressure is reduced to six pounds and the general indications are not objectionable. Cards taken while drifting with the throttle shut, and the reverse lever dropped reasonably low, showed that the maximum compression at 20 miles an hour did not exceed 18 lbs. per square inch in the cylinders, and that this pressure

Diagram No. 1.
Throttle .....Full open
Cut-off .....12 in.
M. P. H.....28
M. E. P.....93.5
I. H. P.....1,147
Back pressure.....10 lbs.

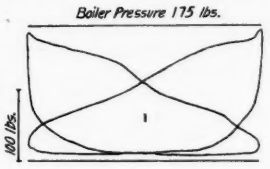


Diagram No. 2.
Throttle .....Full open
Cut-off .....16 in.
M. P. H.....31
M. E. P.....105.5
I. H. P.....1,434
Back pressure.....20 lbs.

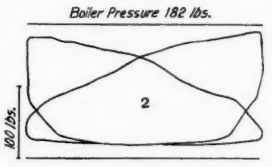


Diagram No. 3.
Throttle .....¾ open
Cut-off .....10½ in.
M. P. H.....37
M. E. P.....66
I. H. P.....1,070
Back pressure.....9 lbs.

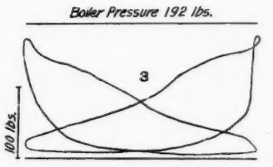


Diagram No. 4.
Throttle .....Full open
Cut-off .....10 in.
M. P. H.....50
M. E. P.....48
I. H. P.....1,051
Back pressure.....10 lbs.

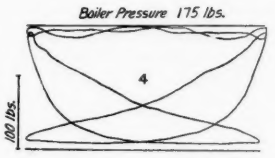
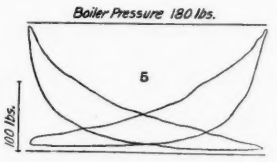
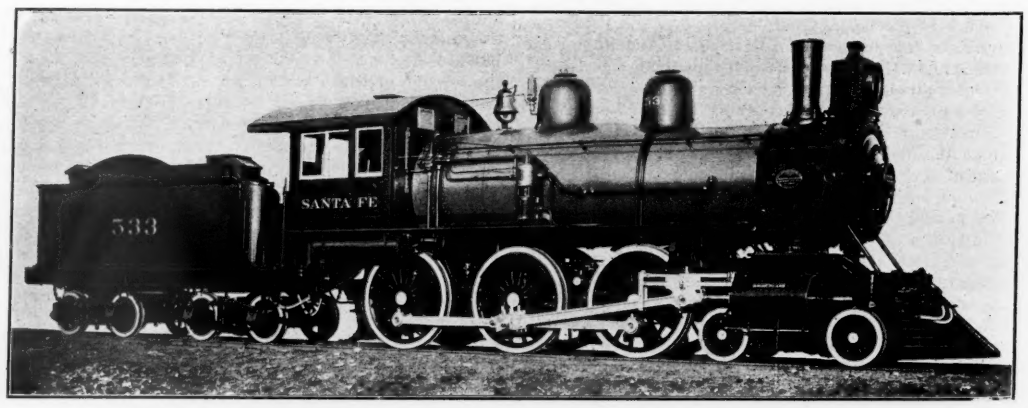


Diagram No. 5.
Throttle .....Full open
Cut-off .....7½ in.
M. P. H.....52
M. E. P.....41.5
I. H. P.....946
Back pressure.....6 lbs.

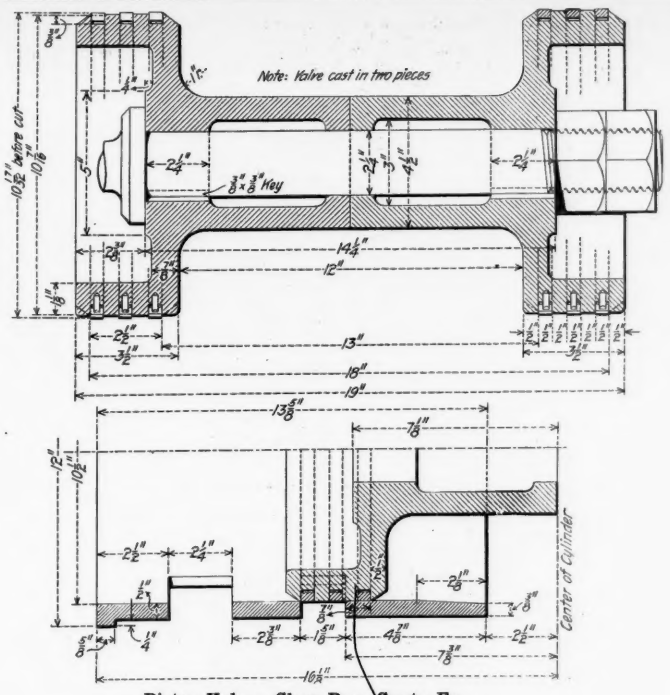


Cylinders, 20 x 28 in.; driving wheels, 67 in. diameter.
Valves, 10½ in. piston, inside admission.
Steam lap, ⅞ in.; exhaust side, line and line.
Valves set line and line, full gear forward; 7-32 in. blind, full gear backward.

Indicator diagrams—Santa Fe Locomotive No. 526.



Ten-Wheel Passenger Locomotive—Class B-15 Santa Fe.

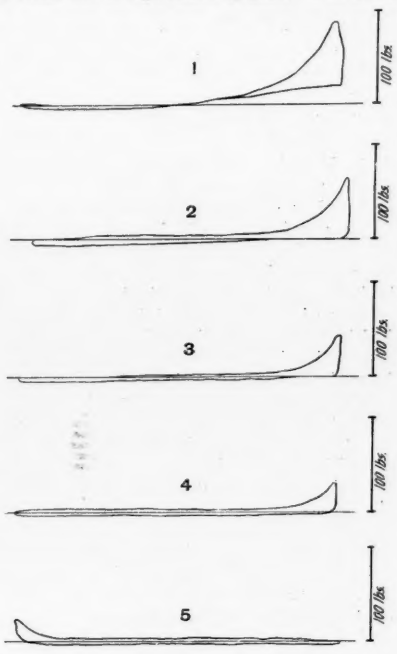


Piston Valve—Class B-15 Santa Fe.

endured for not more than an average of 2 in. at the end of the stroke, the bottom line of the card showing that air admission was free and complete.

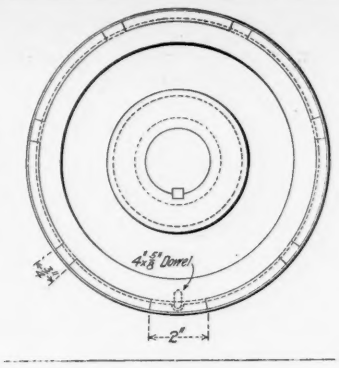
These engines have no special device for relieving compression or admitting air to the cylinders in drifting. In view of the wide discussion that has been carried on in regard to the detrimental effects of excessive compression when piston valves are used on locomotives and no special provision made for drifting, this information is interesting. There is a simple relief valve tapped into the steam chamber of the saddle, at the point shown in the illustrations, and it serves the same purpose as the common relief valve on the ordinary steam chest. There are no excess pressure valves on the cylinder heads, and we are informed that experience with these engines, and also with some simple 21 x 30 in. consolidation freight engines that have piston valves, has thus far shown that no special equipment of the kind considered is necessary.

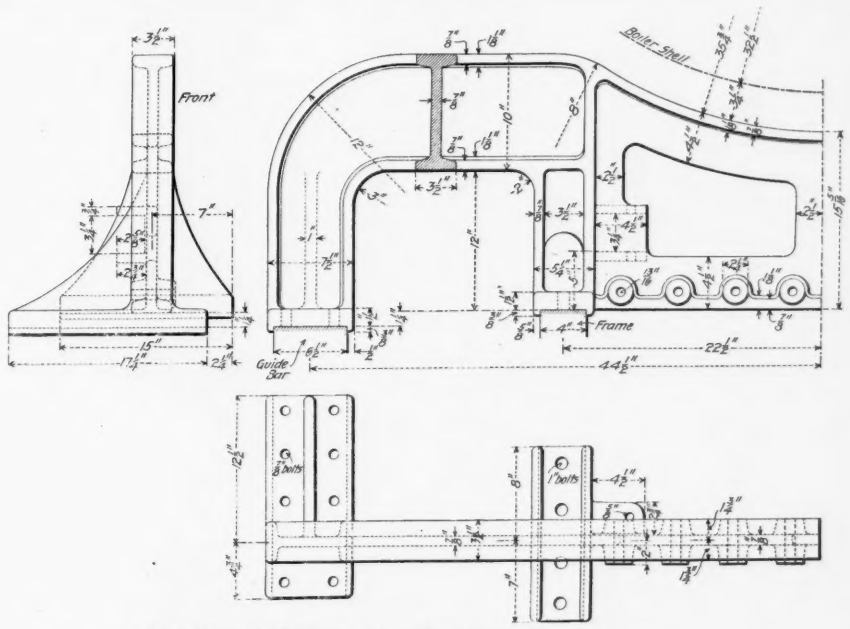
Some records of the original investigation from which this determination was reached have been placed at our disposal, and we have reproduced herewith a series of cards taken while the throttle was shut and engines having piston valves, and no special relief to chests, were drifting. It was established to the satisfaction of those interested that by dropping the lever to as long a cut-off as practicable, without unduly racking the link motion at various speeds, the compression could be held down to a pressure that was not detrimental. It was likewise found that by hooking up the lever to unduly short cut-off while drifting at a speed of approximately 30 miles an hour compression ran up almost as high, and the drifting diagrams were as badly distorted on an engine having D valves as would be the case where piston valves were used. As illustrating this condition there are here reproduced five cards that were taken from the low-pressure cylinder of a 15 and 25 x



Card No.	Cut-off, inches.	Miles per hr.	Revs. per min.
1	9¾	24	144
2	13	28	168
3	17½	22	132
4	20¼	30	180
5	23 7-16	23	138

Drifting Diagrams From a 25 x 28 in. Low-Pressure Cylinder.





Cast Steel Guide Yoke—Class B-15 Santa Fe.

28-in. compound consolidation freight engine of the Santa Fe. The cut-off, revolutions per minute, and miles per hour are given, and these data, with the cards, make clear the reasoning from which it was determined to use no special device for relief of compression in the cylinders of the new 20 x 28-in. passenger engines.

The general specifications of these engines are as follows:

GENERAL SPECIFICATIONS.

Description.

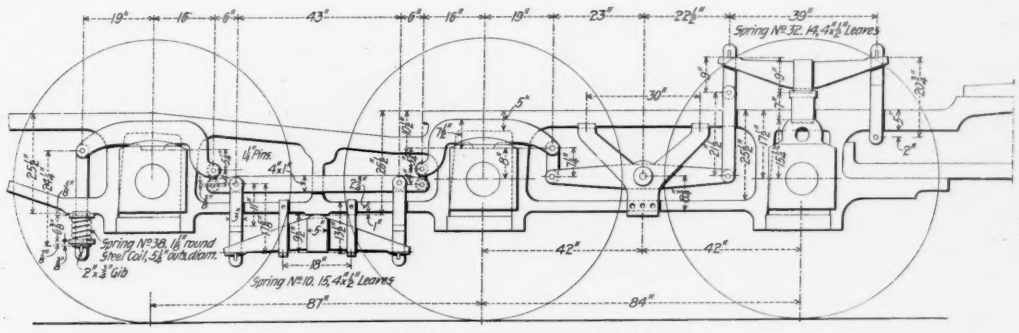
Type	10-wheel passenger
Gage	4 ft. 8½ in.
Simple or compound	Simple
Kind of fuel to be used	Bituminous coal
Weight on drivers	125,930 lbs.
Weight on truck wheels	36,270 lbs.
Weight, total	162,200 lbs.
Weight tender loaded	100,000 lbs.

General Dimensions.

Wheel base, total, of engine	25 ft. 2 in.
Wheel base, driving	14 ft. 3 in.
Wheel base, total (engine and tender)	52 ft. 11¾ in.
Length over all, engine	37 ft. 9¼ in.
Height, center of boiler above rails	8 ft. 6 in.
Height of stack above rails	15 ft. 2¼ in.
Heating surface, fire-box	185 sq. ft.
Heating surface, tubes	2,144 sq. ft.
Heating surface, total	2,329 sq. ft.
Grate area	29.8 sq. ft.

Wheels and Journals.

Drivers, number	Six
Drivers, diameter	67 in.
Drivers, material of centers	Main, cast steel; F. & B., cast iron
Truck wheels, diameter	30 in.
Journals, driving axle, size	Main 9x12 in.; F. & B., 8½x12 in.
Journals, truck axle, size	5½x10 in.
Main crank pin, size	6x6¼ in.



Spring Rigging—Class B-15 Santa Fe.

Cylinders.

Cylinders, diameter	20 in.
Piston, stroke	28 in.
Piston rod, coffin steel; diameter	4 in.
Kind of piston rod packing	Jerome metallic
Main rod, length center to center	10 ft. 1½ in.
Steam ports, circumference	33 in.
Steam ports, width	1⅝ in.
Exhaust ports, circumference	33 in.
Exhaust ports, width	2¼ in.
Bridge, width	2⅜ in.

Valves.

Valves, kind of	Piston; inside admiss., 10½ in. diam.
Valves, greatest travel	5¾ in.
Valves, steam lap (inside)	⅞ in.
Valves, exhaust lap or clearance	0 in.
Valves, lead in full gear forward	Line and line
Valves, lead in full gear, backing	7-32 in. blind

Boiler.

Boiler, type of	Extended wagon top
Boiler, working steam pressure	200 lbs.
Boiler, material in barrel	Otis steel
Boiler, thickness of material in barrel	11-16, ¾, 13-16 and ½ in.
Boiler, diameter of barrel, smallest ring	65 in.
Seams, kind of horizontal	Sextuple riveted
Seams, kind of circumferential	Double riveted
Thickness of tube sheets	9-16 in.
Thickness of crown sheet	7-16 in.
Crown sheet stayed with	Radial stays
Dome diameter, inside	30 in.

Fire-Box.

Fire-box, length	108 in.
Fire-box, width	39¾ in.
Fire-box, depth front	73 9-16 in.
Fire-box, depth back	61 in.
Fire-box, material	Otis steel
Fire-box, thickness of sheets	7-16, 9-16 and ⅜ in.
Fire-box, brick arch	Yes
Fire-box, water space, width	Front, 4 in.; sides, 4 in.; back, 4 in.
Grate, kind of	Rocking

Tubes.

Tubes, number	281
Tubes, material	Lap welded charcoal iron
Tubes, outside diameter	2 in.
Tubes, length over sheets	14 ft. 6 in.

Smoke-Box.

Smoke-box, diameter outside	68¾ in.
Smoke-box, length	61¼ in.

Other Parts.

Exhaust nozzle	Single, permanent
Exhaust nozzle, diameter	5¼ in.
Netting	Wire
Netting, size of mesh	2 x 2, No. 8 wire
Stack, straight or taper	Taper
Stack, least diameter	13¾ in.
Stack, greatest diameter	17 in.
Stack, height above smoke-box	3 ft. 10 in.

Tender.

Type—6-wheel or with swivel trucks	Swivel trucks
Tank capacity for water	5,000 gal.
Coal capacity	10 tons
Kind of material in tank	Tank steel
Thickness of tank sheets	¼ and 5-16 in.
Type of under-frame, wood or iron	Steel channels
Type of truck	Player, cast steel
Truck with	Rigid bolster
Type of truck spring	Double elliptic
Diameter of truck wheels	34¼ in.
Diameter and length of axle journals	5 x 9 in.
Distance between centers of journals	76 in.
Diameter of wheel fit on axle	6⅞ in.
Diameter of center of axle	5⅝ in.
Type of truck bolster	Player cast steel
Type of truck transom	Player cast steel
Length of tank	19 ft. 9¼ in.
Width of tank	9 ft. ¾ in.
Height of tank, not including collar	59¾ in.
Height of tank over collar	71⅛ in.
Type of back drawhead	Tower coupler
With or without water scoop	Without

Names of Makers of Special Equipment.

Sight-feed lubricators	Nathan
Front and back couplers	Leeds reversible, and Tower
Safety valves	Three, Crosby; 3 in.
Sanding devices	Leach
Injectors	No. 10 Simplex, Nathan
Driver brake equipment	Westinghouse American
Tender brake-beam	Sterlingworth
Tender brake-shoe	Christie
Air pump	9½ in. Westinghouse
Steam gages	Star
Piston rod and valve rod packings	Jerome

Shop Floors.

At the December meeting of the Pacific Coast Railway Club one of the questions brought up for discussion was as to the best kind of floor for machine shops, roundhouses, etc., the question to be considered with regard to cost, convenience in handling work and the convenience of the workmen. Mr. J. G. Camp, General Foreman of the Southern Pacific Machine Shop, at Sacramento, said that in general the material least calculated to retain diseased breeding germs is best, but the question of adaptability to the service is important. Stone, brick and cement have always been unsatisfactory. For a paint shop a cement floor will do very well, as the workmen are little on the floor, working mostly on staging or on the car floor. In a repair shop the case is quite different. A man working at a bench should have something for his feet to hold to.

In a machine shop the susceptibility of cement to fracture on very slight impact is an almost insuperable objection; for it is soon full of holes, and worse than no floor at all. As a floor to work on, the same objections as stated above will apply with equal force to a machine shop, whether a man is working on what is technically called the floor or among the tools. Place a man beside a planer, or before a lathe, on concrete or brick, and it will not be long before he will be hunting for a piece of board to stand on.

In my judgment, the material has not been found that, all things considered, can successfully supplant wood for the purpose under discussion. I know objections will be urged on account of its perishable nature, but science has come to the rescue in a great measure.

It is no longer a question as to whether anything can be done to arrest the decomposition of the sap. Experimenters have been busy in this line since 1737, with various results, but for general purposes the process adopted by the Southern Pacific Company, which has been used more or less since 1838, is the most satisfactory, and had the cedar in the floor I referred to been treated by this process, no doubt it would have lasted much longer; at the same time I do not consider it a good material. A block-on-end pavement of some of the close-grained Australian wood, well laid on a concrete foundation, would be very durable, but expensive.

I think the most available, and, under proper treatment, the best and most economical wood floor, would be one made entirely of the spruce, known in the trade as Oregon pine, or Puget Sound lumber. Submit both joists and planking to the creosote process, have the timber originally sawed, say 8 in. x 8 in., then resawed so as to insure a vertical grain for the wearing surface; fill in all interspaces with earth, and on the top put a depth of 2 in. or so of fine coal dust, which is death to all fungi. By this method you will exclude the moist warm air, which in such close quarters as is usually provided under floors of most shops, produces and supports a slow but sure combustion, doing the work of destruction as effectually as a more active fire. I have seen floors of this description, with timbers not sterilized in any way, last longer than any I have seen with a small air space underneath, and certainly they must be far superior in a sanitary point of view.

Bituminous rock, laid on a concrete foundation, hard enough to overcome its tendency to flow under heat or pressure, but not so hard as to destroy its elasticity, would make a good roundhouse floor, and would also answer for a machine shop floor so far as durability is concerned, and would surely meet all the requirements as to sanitary conditions, and, in the end, those of economy, cost, construction and maintenance.

Mr. W. C. Fitch, Master Car Painter at Sacramento, says: At the risk of being opposed and criticised, I am going to give my decided preference for a wooden floor properly constructed, with good ventilation under it at least 2 ft. between the floor and ground, with plenty of outside ventilation leading under the floor. Concrete is entirely unfit for a floor for workmen to be constantly employed upon. It is cold and hard, very severe to feet and limb, and conducive to rheumatism and kindred diseases.

Mr. C. A. Phipp, Foreman of car shops at Sacramento, says: I favor a wood floor: tongued and grooved plank, to be sawed vertical grain. For this section, Puget Sound fir or Southern pine will make an excellent floor. The floor should be laid on wood floor joists or iron girders. Proper space and ventilation should be given under the floor to prevent the accumulation of moisture and also improve the sanitary condition of the shop. For a roundhouse floor, I would favor wood blocks properly laid on a good foundation. In this State, redwood plank, laid on a good foundation of dirt or sand, will make a good foundation for the blocks. If these blocks are manufactured out of Puget Sound fir lumber (the butt cuts of the tree make the best blocks), and laid in a tar and asphalt mixture, the floor will last for years. It should be laid crowning about 1½ in. between pits to allow the water to drain off in the pits. The bottom and sides of the pits should be laid with brick or stone and cement, with proper drainage. While other kinds of floors may be laid for a less first cost, I think this block floor, or pavement, has proven to be the best, and can be kept up at a less cost than any other kind of floor.

For a car repair or erecting shop, if for passenger car work, I would say a wood floor, such as described for machine shops, will give the best satisfaction. Cars can be straightened and heavy work done on this kind of a floor without seriously damaging the floor.

For freight work, a dirt or decomposed granite floor serves the purpose, and is satisfactory in all respects. A little black earth oil sprinkled over the granite improves the surface. This is usually called an "oil floor." S. P. Car Shop No. 5 at Sacramento, one of the largest freight car repair shops in the country, has a granite floor, minus a roof. With the latter covering we would have a first-class shop. For store rooms, sheds and many other railroad buildings, a decomposed granite floor is the cheapest and best, all points considered.

For a coach paint shop, I favor a cement floor. It is the easiest to keep clean and most economical to maintain. A coach paint shop should be used exclusively for painting, varnishing and car trimming. If heavy truck and platform work is carried on the cement floor soon gets damaged. It is not at all suitable for heavy work.

Train Delays.

In our issues of Nov. 23 and 30, 1900, appeared abstracts from the report of a committee of the Pacific Coast Railway Club, presented at the October meeting, on the subject of "Train Delays, Their Causes, Cost, Responsibility for, and Suggested Remedies." We now give a few paragraphs from the discussion at the December meeting.

Mr. J. McKay (Engineman, S. P. Co.).—The report reads as follows: "It may be safely stated that 90 per cent. of the hot pins are caused by the oil feeding out of the oil cup within a short time after being filled; no attention is given to it until it is smoking, then it is too late." What sort of data or experience did the committee rely on to guide them to such a declaration? The statement quoted is quite the reverse of my observation and experience, covering a period of nearly 25 years in engine service. I would like to know where the engineers are, who are so careless that nine-tenths of all the hot pins they have are caused by oil cups feeding out in an unreasonably short time after being filled. I would like to ask the committee, also, if any certain percentage of hot pins is traceable to poorly-fitted brasses; to pounding brasses; to feeders that become stuck; tops that are lost off of, or out of, oil cups; too much keying; flying dirt, grit, etc.?

Mr. C. T. Noyes.—While the various causes of train delays were pretty well brought out, one or two come to my mind that I think were not mentioned. One of them, a prolific cause of delay, is bad water. You know, that on some divisions where they have to use bad water in the boilers of their locomotives, about all the engine failures are laid to its use. Another cause of a large number of engine failures was not referred to by the committee, which is the primary cause of many failures that the engineer, fireman or inspector has to suffer for. These failures are the result of the inferior material and careless workmanship put into the locomotive when it is built. Referring to that portion of the paper on overloaded trains, which is a severe criticism on a certain method of tonnage rating, I would like to say that, as far as my knowledge of the method goes, and I have a pretty fair understanding of it, there is not one word in the nature of an order or otherwise, that requires a Superintendent or Yardmaster to overload a train at any time. All that is expected, as I understand it, is that all concerned will do their best to take such a load as they can haul over the division on schedule time, and at the same time keep in view the best possible efficiency. No one is expected to blockade the track with trains, impede traffic, overload the locomotive to the break-down point, oblige the men to work double time, or any of the numerous evils ascribed to tonnage rating. The thought occurs to me that if I were an official operating the trains on any division, and got things mixed up as indicated in the paper, it would imply that I was not equal to the situation.

Mr. W. S. Palmer.—We should more closely regulate the service to the means at our command. Trains should be classified and loaded accordingly. Tonnage rating should be carefully established for the varying conditions of each class. In passenger service a few rules should invariably be followed. Limited high-speed trains should have a large margin of extra power. The number of cars in such trains, for given power, when once established, should never be exceeded. Light but fast locals should diminish to the utmost the stops of heavy through trains hauling line cars. Such through trains should never be loaded over 80 per cent. of the capacity of the engines available. In freight service every effort should be made to reduce the number of "manifest" or "limited" trains. Careful classification of freight that may be carried on such trains would seem advisable. Such trains should be run at a maximum speed of 30 miles per hour with a load carefully graded to correspond and "limited" to the utmost extent. If "manifest" trains must fill out at important junctions ample time should be allotted in the schedule. "Through" freights should be run, handling important loads, doing no way work, and making good time, maximum 20 miles per hour—load to correspond. These trains would be the equivalent of the "through" passenger trains, and would relieve the "limited" freights of much of their excessive burden. "Tonnage" freights running at slow speed should carry the bulk of the business—these to be loaded to full engine rating. Such trains should make few stops. "Way" freights gathering tonnage for the others, working over short distances only, would complete the regular service. Extras might be run in either the "through" or "tonnage" class.

In all cases ample time at originating terminals should be allowed, even if higher speed must be used en route. An initial delay is usually fatal. This is also true of passenger trains. Ten minutes sacrificed to load baggage, mail, express, cut in an extra car, etc., can be ordinarily "made up" by extra speed at some favorable point, if train is "on time"—if late, meets come wrong, other trains are held, more orders given, resulting in irritation and delay.

Summing up: We should make a reasonable schedule, carefully classify our train service, run sufficient trains to overburden none, rigidly adhere to restrictions in load and stops in limited service, make organization of operating divisions such that the personal equation of the officials may count, and, lastly, relieve some of the strain on the men handling trains (despatchers, engineers and conductors), to the end that they may not chafe under continued spurring to accomplish seeming impossibilities. Under such conditions train delays will be reduced to a minimum.

Electric Drive in Shops.

At the Nov. 15 meeting of the Franklin Institute the Electric Distribution of Power in Workshops was discussed. A few extracts from the discussion follow:

Prof. F. B. Crocker (Columbia University).—The electric driving of tools and machines must possess important advantages in order to achieve such rapid and general success in its very short career. Some of the points of advantage that it possesses may be summed up under the following heads:

(1) Saving in Power.—This is generally the first point to be considered, but is by no means the most important, as cost of power in most factories and mills is only 1 to 3 per cent. of the total expenses, the cost of labor being usually many times greater.

(2) Cost of Buildings.—Since heavy overhead shafting is not required for electric driving, the buildings may be made much lighter and cheaper in construction.

(4) Arrangement of Machinery.—The use of electric motors enables the machinery to be placed in almost any desired position.

(5) Clear Head Room.—The elimination of overhead belting and shafting by the use of motors gives a clear head room, which enables overhead cranes to be used freely, and also avoids the great obstruction to light and air, which is a serious objection to the old-fashioned methods.

(10) Shut-Downs Less Frequent and Less Serious.—An accident in an electrically-driven plant usually has a local effect only, simply shutting down one or a few machines.

(11) Speed Control.—The variation of speed that is possible with electric driving, and the convenience as well as range of control, are very great advantages with most kinds of machinery. The operator can drive the tool to its limit of capacity, and can on the other hand instantly relieve it of strain, if he finds it necessary.

(12) Increase of Output.—Owing to the many advantages named above, but especially on account of clear head room for overhead crane service, and convenience of speed control, it is found that the output of manufacturing establishments is materially increased in most cases by the use of electric driving. It is often found that this gain actually amounts to 20 or 30 per cent., or even more, with the same floor space, machinery and number of workmen.

Mr. Samuel M. Vauclain (Baldwin Locomotive Works)—Many difficulties were encountered [in the introduction of electric drive], but in the end all were satisfactorily overcome, and the speaker was now prepared to place on record his cordial indorsement of the modern method, on the score of its many and great advantages.

The speaker favored belt connections for tools in which there was considerable jar, on account of the elasticity of the method. He pointed out also that machine tools as at present built were not adapted for motors, and in so adapting them he would not alter the structure of the tool so that motor and tool would be one unit, but would provide room so that any motor from the market could be applied as an extra device.

He dwelt at some length upon the important economies in the saving of floor space and in operating expenses which had been realized in the Baldwin works by the introduction of the electric driving system, in testimony of which he made the statement that "if we should abandon electric driving, our manufactured product would now cost us from 20 per cent. to 25 per cent. more for labor;" and again, "were it not for electric driving, the Baldwin Locomotive Works would have to cover 40 per cent. more floor space than they now do, to maintain their present output."

Mr. Vauclain said, in conclusion, that while the question of the saving in power which the adoption of electric motors permitted was of importance, it was by no means the deciding factor, and that he would put in electric driving systems not only if they saved no power, but even if they required several times the power of a shaft and belting system to operate them.

Mr. W. C. L. Elgin—The motors made by the leading manufacturers to-day are very much improved, from a mechanical standpoint, from those with which Mr. Vauclain had so much trouble ten years ago. This is well borne out by the fact that in the Baldwin Locomotive Works one and one-third men take care of all their motors to-day, and, as they have motors of a number of manufacturers, it is now fair to assume that electric

motors require less attention than any other form of motor. And, although it is true that the motor has been materially improved, the auxiliaries used in connection with the motor have not advanced with the same progress. The flimsy construction of the switches, starting boxes and the cutouts, which are in many cases installed to-day, are invariably the cause of many interruptions of service for which the motor is in no way responsible. The arrangement of the wiring is a matter which should be given more careful attention. With the increase of the size of the individual motors which are now being used, much more satisfactory service could be obtained by the use of a circuit-breaker instead of a fuse. All the auxiliaries necessary for the operation of the motor should be arranged in a compact form and enclosed firmly in an iron box, the operation of starting and stopping the motor being controlled by a single lever. The increased cost of substantial equipment will be balanced by improved service and reduced cost of maintenance. I feel that this part of the plant has been the one which has been the most neglected, but which is equally as important as good electrical and mechanical design of the motors.

Mr. Carl Hering—I will limit myself to a few words concerning the use of the multiphase induction motor for such work. The induction motor has no commutator, brushes, brush holders, etc., and therefore there is no sparking; it is extremely simple in construction, is not liable to get out of order, and requires no attention except oiling. It is easily started with full load, the larger ones requiring for this purpose some simple slide rings, at which, however, there is no commutation and therefore no sparking. It runs at nearly constant speed, and can stand considerable overload. It appears to be an important step toward the ideal motor for use in workshops where it is often put in out-of-the-way places and is taken care of by men who are as a rule not electricians. In a few cases its constant speed is an objection, as for crane work for instance, there being as yet no satisfactory method in use for varying its speed without impairing the efficiency; but such cases are the exception, and the induction motor is in that respect like a line of shafting, which also runs at constant speed, or is supposed to do so.

The ideal workshop system would be to have a motor for each tool or machine, but this is expensive on account of the cost of the motors and of their attendance and repairs. The induction motor goes a step farther toward this ideal than the continuous current motor, as it seems to be smaller, lighter, simpler and cheaper, for the same output and speed, than its rival.

While in Europe this summer I noticed the great progress that has been made there in the introduction of this type of motor. The largest electrical factory in Germany, and perhaps in the world, is equipped entirely with them, and mostly with a motor for each machine or tool. Even the rolling mills of that factory are driven with induction motors. Moreover, the three-phase system as distinguished from the two-phase, is used almost entirely there, especially in Germany and Switzerland. A single textile factory in Switzerland has 500 such motors. Even some railroads in Switzerland are operated with them.

Mr. Dunn—Contrary to Mr. Hering's view, I consider that so far for factory distribution the direct current motor possesses many advantages over the alternating. For instance, one of the principal requirements of machine shop work is adjustability of speed; in fact, it is to the facility with which electrical motors permit this adjustment that many of the enormous savings we have been discussing are due. It is also a fact that this, in particular, has not yet been accomplished by induction motors.

Again, the starting torques of induction motors are much less than those of direct current machines, and in such service as crane work and similar kinds of duty, very large starting torques are requisite. Ordinary constant speed induction motors of the kinds built in this country do not develop, at starting, more than from 1½ to 2.2 their normal running torque, whereas direct current motors will easily develop in starting from four to six times their normal running torque. Of this point corroboration may be seen in most recent practice. Plants which have installed alternating current distributions have been obliged also to install alongside of them direct current distributions for the proper handling of cranes and similar machinery.

The induction motor requires enormous starting currents. I know of a case where the disturbance to the system from this cause is so great that an annunciator has been put in the engine room with communication to and from each of the motors, so that only one motor may be started at a time on receipt of an answering signal and that the attendant in the engine room may be advised to "stand by." Direct current motors do not take abnormal currents in starting, nor are they affected by wide or sudden variations in voltage.

Lackawanna Signal Rules.

The new code of instructions governing the use of interlocking and automatic block signals, which has recently been issued by the Delaware, Lackawanna & Western, contains eight pages of illustrations showing the different indications of the various signals. These cuts are printed in four colors, red being the color used on the face of signal blades, except those of distant signals, and as the night color for indicating "stop"; yellow for the face of distant signal blades and the night color for caution; and green the night color for go-ahead in all signals. Where there are two semaphore arms on a single post (for diverging routes) the lamp of the lower signal is obscured when the arm is in the horizontal position, and black is used in the drawing to show this indication.

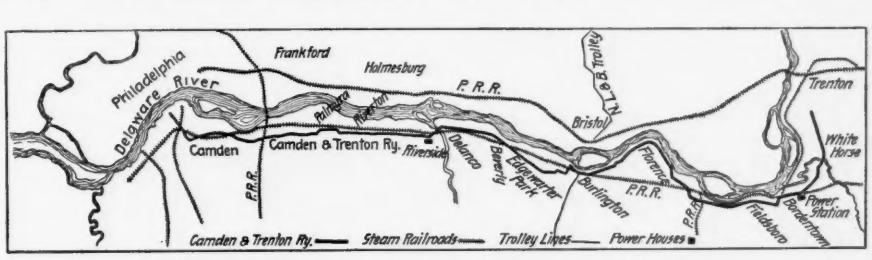
The general rules for enginemen and trainmen fill only 2½ pages. Arms are not put on semaphore signals until they are put in service, and the same practice is followed in the case of disk signals. When a block signal is out of order, the letter C, indicating caution, will be displayed in place of the number of the signal, and where this letter is displayed enginemen are not required to make a detailed report of delays. A train finding an automatic block signal against it must wait one minute before proceeding under control to the next home signal, though when the letter C is displayed the stop is not required. The requisites and adjuncts of the Standard Code are printed in the book.

A New Electric Line Between Camden and Trenton, N. J.

The Camden & Trenton Railway Co. has opened an electric line affording direct connection between the two cities of Philadelphia and Trenton, N. J. The line is about 30 miles long and runs from the Market Street Ferry, in Camden, opposite Philadelphia, northeast through the territory bordering on the New Jersey side of the Delaware River, to a connection with the street railroad line of Trenton. The cars of the company are to run down to the ferry in Camden over the tracks of the Camden & Suburban. The complete run, including trackage at both ends, is 35 miles. Following are centers tapped along the line, with the distances from Market Street Ferry, population and fares between points:

	Miles.	Population.	Fares between points.
Camden	..	76,000	..
Palmyra	7	3,100	..
Riverton	8½	1,800	10c.
Riverside	12	3,000	5c.
Delanco	12½	900	..
Beverly	15	2,500	5c.
Edwewater Park	16	450	..
Burlington	18½	11,000	5c.
Florence	24	1,950	5c.
Fieldsboro	28½	600	..
Bordentown	30	5,500	5c.
White Horse	33	100	..
Trenton	35	75,000	10c.
	35	181,900	45c.

At Burlington the road connects with the line of the Burlington & Mt. Holly Traction Co., which runs south 7.15 miles to Mt. Holly. The line also runs close to the ferry at Burlington for Bristol across the Delaware, where connection may be made with the Newtown Electric Street Ry. for Newtown, some 10 miles north of Bristol. Without including the business originating at Philadelphia, the company estimates a population of 200,000 directly tributary to the road.



The New Line of the Camden & Trenton (Electric) Ry.

The Camden & Trenton owns the entire capital stock of the Cinnaminson Electric Light, Power & Heating Co., which lights the towns of Beverly, Delanco, Riverside, Riverton and Palmyra. It also owns 85 per cent. of the capital stock of the Bordentown Electric Light & Motor Co., which supplies light to Bordentown and vicinity. The franchises for the railroad were granted to the Monmouth Traction Co., which was incorporated March 14, 1893, and was operating five miles of road at the Trenton end when the name was changed to the present title in October, 1899. The authorized capital stock is $1,000,000, all outstanding. The company has authorized $750,000 first mortgage 5 per cent. gold bonds which are being issued at the rate of $20,000 per mile of completed road. These are a first mortgage on the entire property and franchises of the company, and also on the capital stock which the railroad owns in the two electric light companies.

The company expresses its belief that at no distant day there will be a consolidation with the Camden and Trenton street railroad companies and that the Camden & Trenton will form a link in a through electric line between Philadelphia and New York. The earning capacity of the 30 miles now about ready for operation is estimated by the company at over $180,000 per annum, or above $200,000, including the gross earnings of its share of the two electric light companies. Estimating operating expenses at 55 per cent., and with $37,500 fixed charges, the company puts the surplus at $54,000, or more than 5 per cent. on the capital stock.

Three lines of steam road make direct connection between Philadelphia and Trenton. The Pennsylvania main line and the Philadelphia & Reading on the Pennsylvania side of the Delaware, and the Camden & Amboy line of the Pennsylvania, which runs directly through the territory of the new electric road from Camden to Bordentown, whence a branch line continues the paralleling to Trenton. The effect of the electric lines upon these steam lines, and particularly upon the Camden & Amboy line of the Pennsylvania, is a matter for the future to determine.

The Camden & Trenton Railway has two power-houses of brick and steel, one being at Riverside, N. J., in which is installed two 250-k.w. Westinghouse direct-connected generators, that are connected to two 350-h.p. compound condensing slow-speed Green engines. The engines were made by the Providence Engineering Works, Providence, R. I. Steam is supplied by two 250-h.p. and one 175-h.p. water-tube boilers, made by the National Water Tube Boiler Co. The other powerhouse is located at Bordentown, and has a 200-k.w. Westinghouse generator, a 350-h.p. belted engine, and a 300-h.p. water tube boiler. The power is generated at 600 volts at the powerhouse and is transmitted a distance of eight miles each way from the powerhouse. It will be possible to maintain a voltage of over 500 at any point along the line.

There are in operation two single truck cars 18 ft. bodies, equipped with two 30-h.p. Westinghouse motors; also three double-truck duplex cars equipped with two 50-h.p. Westinghouse motors. There are being delivered eight double-truck cars, 42 ft. bodies, steam coach type, equipped with two 50-h.p. Westinghouse motors. These cars were made by the St. Louis Car Co. and are very elaborate in design and finish. Each car has a smoking compartment in one end, partitioned off from the body of the car by a glass partition. The interior finish is in mahogany. There are reversible cross seats, upholstered in frieze plush.

Railway Signaling Club.

The January meeting of this club was held at Chicago on Tuesday of last week. The principal discussion was on the paper on derailing switches, by Mr. Elliott, which was given in the *Railroad Gazette* on Jan. 11.

Nearly all of the speakers were strongly in favor of using derails, and thought that the Eastern men, who at the St. Louis meeting and elsewhere have claimed that with good discipline derailers would be unnecessary, ought to be asked to show their records. To convince members that derails are unnecessary evidence should be given that collisions do not occur where they are not used. Besides hearing the opinions of members present the meeting listened to letters from Mr. F. G. Ewald, Mr. A. H. Rudd and Mr. J. I. Vernon. The first two favor derails. Mr. Rudd, on the Lackawanna, is putting them in at all grade crossings, using them on both tracks both sides of the crossing, dwarf signals being provided for reverse movements on double-track lines. He cited a recent collision of passenger trains at Perth Amboy, N. J., which would have been prevented if a derail had been in use. Mr. Vernon (N. Y., N. H. & H.) believes derails unnecessary in main lines, except at drawbridges. He would use them, however, in side tracks leading to a main track. The question, he holds, is entirely one of discipline; with competent enginemen the derail is little needed.

Mr. Hovey (Taylor Signal Co.), being asked his opinion, said he deemed derails an important safeguard. It is hard to discipline enginemen to stop for signals, and if they did not know that derails were in the track, they would become still more careless.

Following Mr. Hovey's remarks there was some discussion as to the use of derails on high and narrow embankments; whether guard rails should be provided in such cases to keep a train in line. Most of the speakers who use guard rails lay them for about 90 ft. to 120 ft., the derail being 500 ft. from the crossing. Opinions as to the best length for a guard rail were, of course, vague, for the speed of the train is a main element in this question, and on this the signalman had little or nothing to say. Instances were given of trains running off derailing switches and over the crossing some distance before they could be stopped. One member advocated the omission of the guard rail. If an engineman runs off, let him have a good, strong lesson, so that he will look out for that derail thereafter.

It was stated that in the 141 accidents tabulated in Mr. Elliott's paper only one person was killed.

Mr. Denny (C. & N. W.), who came in after the discussion was finished, said, in reply to a question, that discipline is the main thing; if enginemen are trained to obey the signals the derail is unnecessary.

The discussion on derails having brought up the question of broken red glasses inquiry was made concerning the kinds of glass used by members. The Chicago, Milwaukee & St. Paul has Roundell's red glass in all its signals. These glasses are not easily broken. The Cleveland, Cincinnati, Chicago & St. Louis runs no risk of false signals by the breaking of a red glass, as only green glass will give a go-ahead signal at night. For dis-

tant signals this road uses yellow glass. Most of the yellow lenses are procured from the Corning Glass Company. The enginemen like the new colors, and there has been no misunderstanding of signals.

The question of the most suitable material for battery jars being brought up, Mr. Hovey spoke in favor of the use of glass jars for gravity batteries and porcelain for potash batteries. For the former glass is necessary to enable the attendant to see the solution. With potash batteries the stronger porcelain should be used because the failure of a jar is more dangerous; escaping liquid is liable to burn the attendant.

Inquiry being made concerning the Miller block signal a member described the installation on the Chicago & Eastern Illinois. In this system a white and a red incandescent electric lamp are provided in the cab of the locomotive, and the electric current to light these lamps is automatically controlled by a relay, which is opened and closed by a track circuit which is led from the rails into the cab through the wheels of the engine or tender. When the white light burns it indicates a clear track ahead for two block sections; when the red light burns it indicates that the second block section ahead is occupied by a train. About four miles of road is equipped for working this signal. There are no fixed signals at the side of the road.

The Pennsylvania Railroad's Spring Plant at Altoona.

A number of years ago the Pennsylvania Railroad began to make the elliptic springs used on its cars and locomotives. The plant was small, and to a certain extent experimental, but the success of its operation and the quality of the springs made was so satisfactory that it has been continued and enlarged, and is now one of the permanent departments of the shops. Before the organization of this shop, the officers of the motive power department made a careful study of the action of springs, and had a series of tests made at the Watertown arsenal with a view to establishing the accuracy of the Reuleaux formula. This done, it remained to specify the quality of steel to be used, and the calculated properties of any spring could be realized in manufacture.

As spring-making on a large scale is not a widespread industry, and as most of the large manufacturers are using machinery of their own design, that is not on the market, it became necessary to build special machinery. Through courtesy of the officers in charge, we now give engravings of the several machines that are in use, together with a description of their operation. No helical springs are made in the plant, the work being confined to making and repairing elliptic springs for passenger cars and locomotives on the lines east of Pittsburgh. A few springs are sent West.

The plant is in a one-room wing of the blacksmith shop. All work, from the shearing of the plates to the banding and testing of the springs, is done there. The first machine used is a heavy combination shear and punch, by which the plates are cut to the proper length. This machine was designed and built at Altoona, and will be described later. After the plates have been cut to length they are placed in one side of a double-sided oil furnace, where they are first heated at the center. They are then taken to a nibbing machine. The nib consists of a small projection upon one side of the plate, at the center of its length and breadth, with a corresponding depression on the other side, by means of which the consecutive plates of a spring are held in their proper relative positions and prevented from slipping over each other.

From the nibbing machine the plates are carried back to the furnace, and are heated at the ends. They are then returned to the same machine, and are tapered at the ends. The tapering is done by first upsetting on the edges and then drawing the ends out again to the full width of the plate. This drawing slightly increases the length of the plates. While they are still hot, they are cut to the proper length by a shear on the nibbing machine, using the nib for the point of measurement. One end of the plate is allowed to cool before the other is heated.

When the plates have been so treated they are ready for shaping to the proper camber. For this purpose, they are again heated, this time throughout their whole length, and rolled to the proper camber in the cambering machine. A template is used for the shaping of the master leaf only, which is then used as the template for the forming of the next leaf; a process that is repeated for each successive leaf.

As soon as the leaves are rolled to shape, and while they are still red hot, they are dropped into a tank of oil for hardening. In one end of a large heating furnace there is a space separated from the main heating chamber by a brick bridge wall, which is kept at a uniform temperature, and in which the plates are placed for an annealing heat. The temper obtained in the oil bath is here drawn. When the temper has been drawn the leaves are fitted over each other, and each spring is built up separately. The tempering and annealing of the plates naturally warp them slightly, so that some straightening is required for each one. This is done by a few blows of a hammer delivered either directly upon the plate or through a flatter, using a heavy surface plate as an anvil. The spring is now ready for banding.

The bands are turned and welded by hand, and are then heated and slipped over the spring, the plates of which are clamped in position. The bands are tightened and shaped to the spring by a hydraulic press, having two plungers which are brought to bear against one side and the bottom of the band, squeezing it against the leaves and conforming it to their sectional contour. The cooling of the band tightens it in position by the natural shrinkage, and the spring is then ready for the testing machine. Each spring is tested under the load that it is intended to carry, and a record made of its deflection. If this deflection falls within the prescribed limits of variation, the spring is passed, and, after being painted, is sent to storage. The painting is done by a spraying machine.

In the making of each class of spring there is a certain amount of extra work to be done on the master leaf. It is either the slotting of the end to permit the passage of the hanger; the welding on of pads for holding hanger keys in place, or the bending of the ends for the joining of the two sections of the elliptic. The first item of this work is done on the combined punching and shearing machine, already alluded to; the others are done by hand by the blacksmith, no attempt having been made to use a machine for curving the ends, as in the case of the regular makers, where the output is much larger than at Altoona. As in the other shops and departments at Altoona and elsewhere on the Pennsylvania, all is piece work, and is subjected to a rigid inspection.

The process of making elliptic and semi-elliptic springs will thus seem in outline to be a very simple one, but skilled workmen must be employed to meet the requirements, and special machinery is needed that the cost may be kept down. The machinery and tools in use in the plant consist of:

1 combined punch and shears.
2 combined nibbing, rolling and shearing machines.
6 oil furnaces for heating plates and bands.
2 machines for spring forming or cambering.
4 iron tanks for tempering fluids.
2 tables for spring fitters.
1 hydraulic spring banding machine.
1 hydraulic spring testing machine.
1 hydraulic spring stripping machine.
1 air hoist for finished work.
1 air paint-spraying machine.

The first of these machines, the combined punch and shears, is very powerful, and is shown in front elevation in Fig. 1. The frame of the machine, it may be seen, is formed of two castings bolted together, below the gap for the center driving gear, by three 1½-in. bolts on each side. The eccentric shaft is 9½ in. diam., with pins on the ends, for moving the cutter heads, 6½ in. diam., set 1½ in. eccentric, whereby a motion of 3 in. is imparted to the heads. The gaps of the machine are quite small, because only narrow material is to be cut or punched, and a great depth is not needed. The diameter of the driving pinion is 8 in. and that of the gear 54 in., with a common face of 6 in.

All heating is done in oil furnaces built upon the same general plan, but varied in detail to meet the requirements of the special work that is to be done. The furnaces in which the heating for nibbing and rolling the taper on the ends of the leaves is done is double, with access to the interior from each side. The one in which the leaves are heated prior to cambering and tempering is larger than the others, and has a bridge wall built across it at some distance from one end, and arranged so that heat enough will cross over to draw the temper on the leaves after they have been hardened. The Walton Rees oil burners, shown in Fig. 2, are used. These burners were invented in the department. Oil is led into them under a pressure of about 6 lbs. per square inch, through a ⅛-in. pipe, having an ordinary right-angled elbow on the inner end. The oil, issuing from the pipe, strikes against the ball A by which it is broken up into a spray and is then caught by the blast and carried into the furnace. The blast is furnished by an ordinary fan, the pressure being 6 ounces. The ball A is held by two wedge-shaped arms B, and set at right angles to them are two of a similar shape for carrying the bell-shaped nozzle C, by which the oil is thrown into the furnace in the form of an annular jet. The burner is set just inside the casing of the furnace and well back from the working face of the brickwork, as shown in Fig. 3. From the mouth of the burner the brickwork is cut out in a flare so as not to interfere in any way with the effective spraying of the oil. The metal of the burner is so well shielded from the heated surfaces of the brick that it is protected against melting.

The double-sided open furnaces, for heating the leaves, have no doors and the area over which the metal is subjected to the action of the flame is quite limited, since but a small portion of the plate is to be heated at any one time. The other furnaces have doors, and have the interior so constructed and the burner so located that the natural course of the flame is from the burner, around the fire-box, close to the wall, and out at the vent. This is shown in the sectional plan of the heating furnace, Fig. 3. The combined jet of oil and air issues from the burner at A and follows along the walls B and C until it strikes the pocket D in the front wall near the door. There it is turned in toward the center, thus creating a swirl over the whole area of the fire-box, and, at the same time, protecting the door from the escape of the flame.

The front door is of the ordinary sliding type, with a counter-balanced lever for raising and lowering. On the side opposite the burner there are two holes 2½ in. wide by 4 in. high for porter bars, and these holes are also so set that the flame sweeps across their front face, with little or no tendency to escape. The brick lining is 9 in. thick with well rounded corners, and the whole is held in position by a metal casing strengthened by buck-stays that are made of old steel rails and tied together with ¾-in. bolts. Fig. 4 is a front elevation showing the arrangement of the door and the blast pipe E. Fig. 5 is a side elevation in which is shown the location of the holes for the porter bars, the arch of the roof, the slope of the floor and the position of the slag holes.

The nibbing, rolling and shearing machine is shown in front and end elevations in Fig. 6. It really includes three distinct machines, the main shaft of which is carried on four standards. At the extreme left is the nibbing device. The shaft runs continuously at a speed of sixty revolutions per minute, and at this point is carried by the boxes F and G. The nibbing punch H is held by a screw cap to the head I, which has an open jaw on the front face, in which the eccentric on the shaft turns. When not in use the head is held to the extreme upward position of its travel by a spring K acting against the underside of a nut on a stud screwed into the head. The shaft is thus free to revolve, and the eccentric is clear of any contact with the metal of the jaws, so that there can be no wear. When a plate has been heated and the end placed against the stop L,

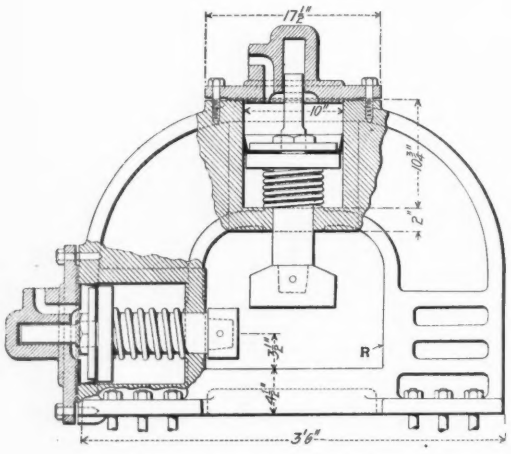


Fig. 10.—Hydraulic Band Press.

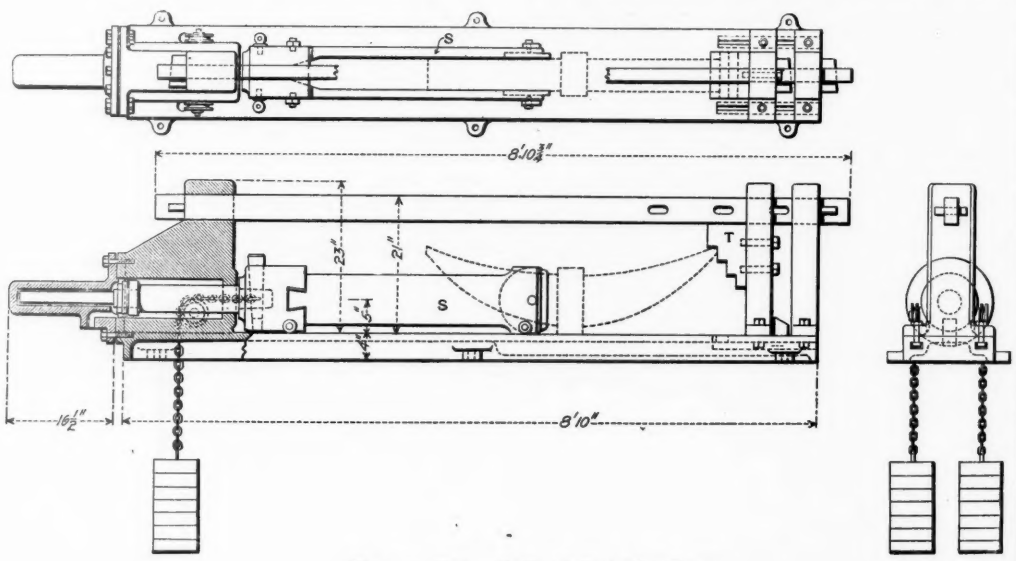


Fig. 11.—Hydraulic Band-Stripping Press.

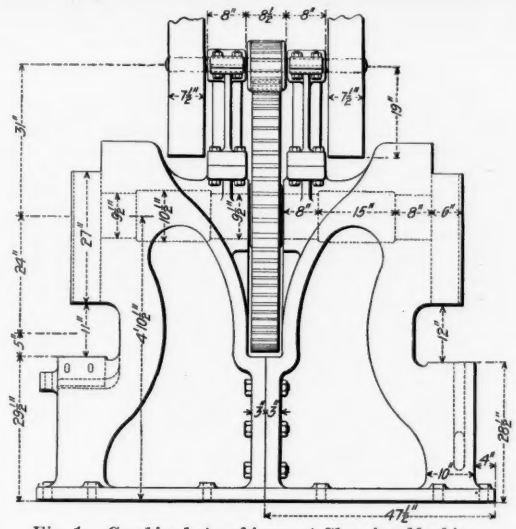


Fig. 1.—Combined Punching and Shearing Machine.

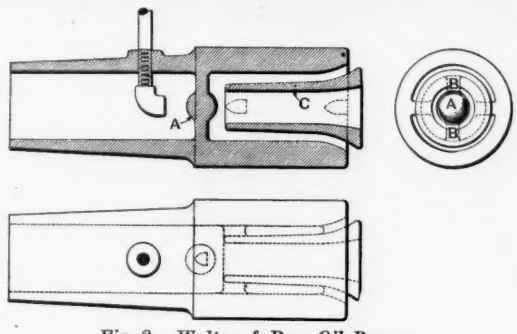


Fig. 2.—Walton & Rees Oil Burner.

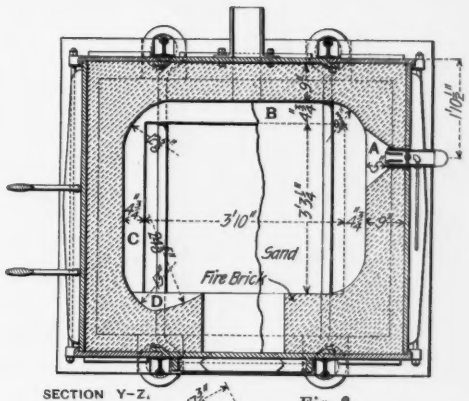


Fig. 3.

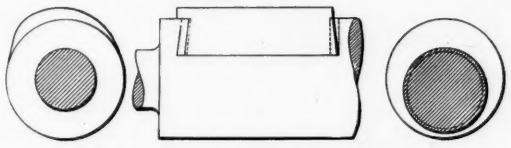


Fig. 7.—Roll for Tapering Spring Leaves.

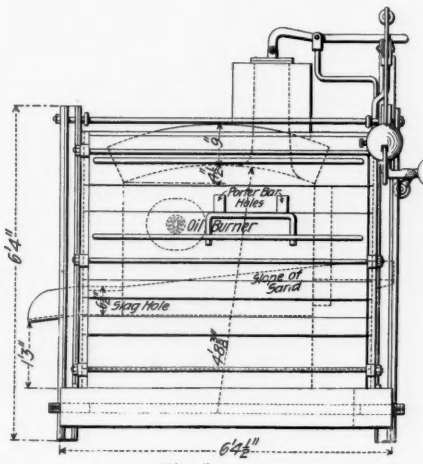


Fig. 5.

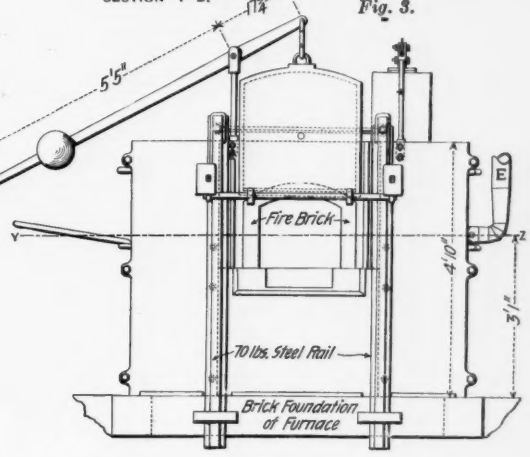
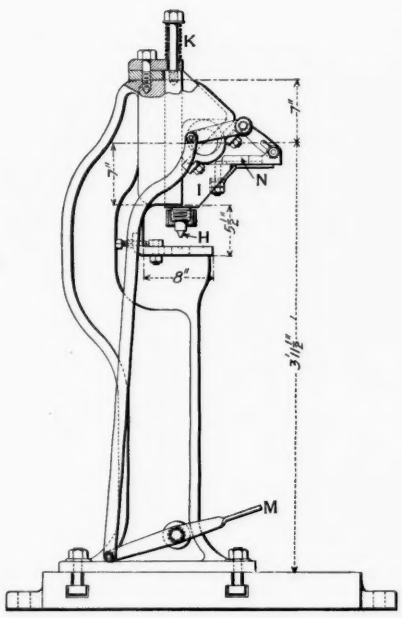


Fig. 4.

Oil Furnace.



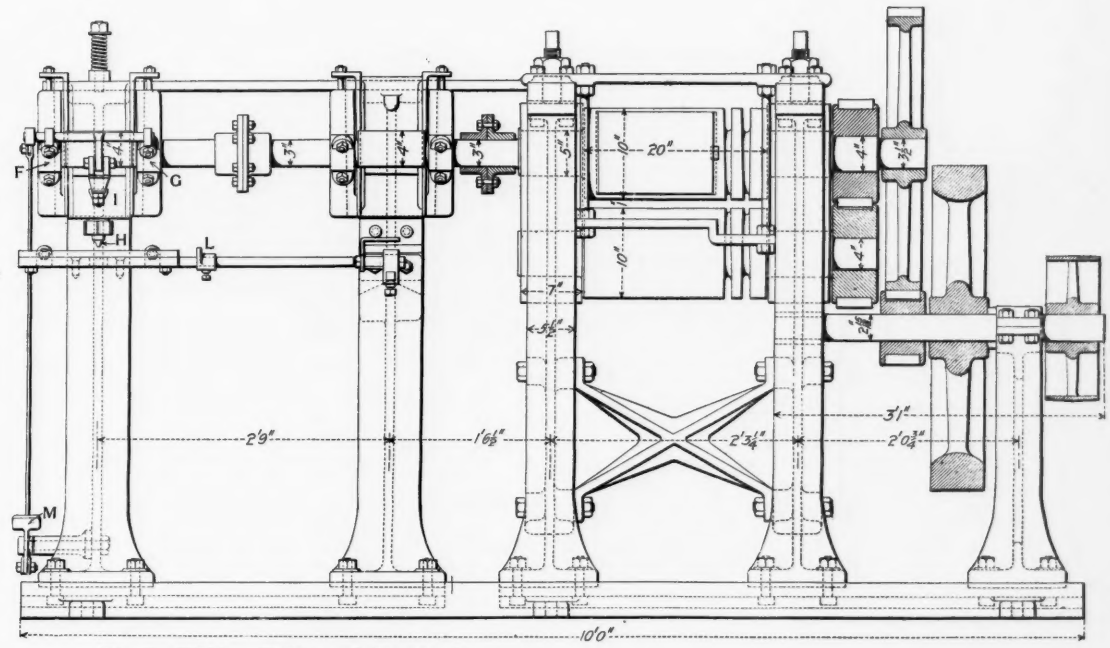


Fig. 6.—Nibbing, Rolling and Shearing Machine.

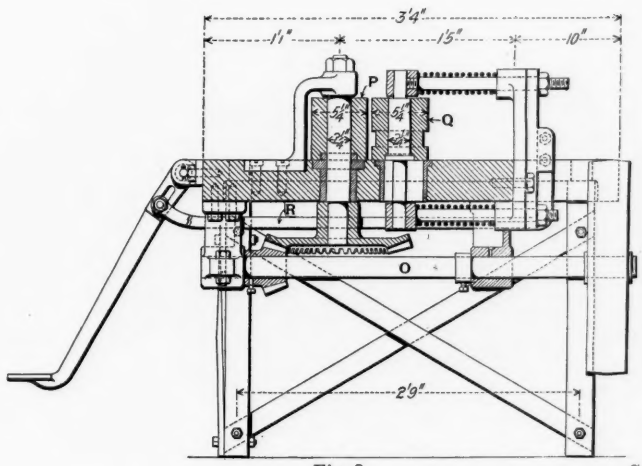


Fig. 8.

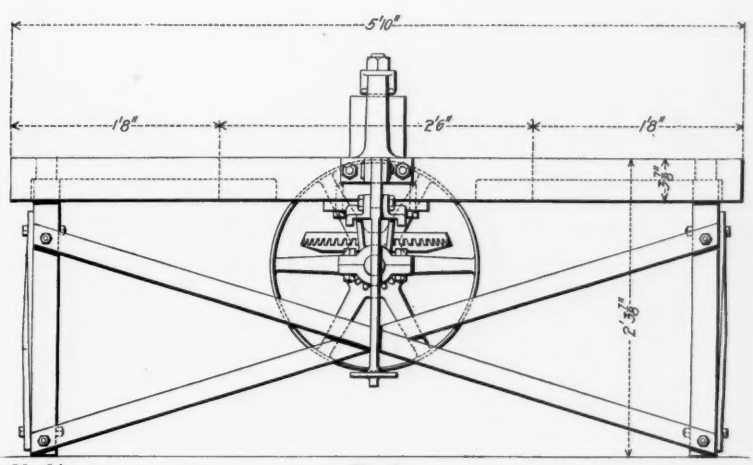


Fig. 9.

Cambering Machine.

The Altoona Spring Plant—Pennsylvania Railroad.

the operator presses down upon the treadle M, thus, through the combination of levers shown in the end elevation, pushing the contact plate N beneath the eccentric, which then drives the nibbing punch downward.

The rolls for tapering the ends of the leaves are to the right of the machine. They consist of two rolls, each 10 in. in diameter. To one side of each of these rolls a cam is fastened, which has a thickness of ¾ in., and comes down on the sides of the rolls to within 2 in. of the center; this is shown in Fig. 7. At the right hand ends of the rolls two eccentric grooves are cut, the shapes of which are also shown in Fig. 7. The grooves are used to upset the end of the leaf so that when rolled on the flat it will be drawn out to the normal width of the plate. The dimensions of the grooves are such that one or the other will cover the whole range of work.

The operation is simple. The rolls revolve so as to deliver material toward the operator, who stands in front of the machine. Receiving a leaf with a heated end from the furnace, it is first thrust edgewise between the rolls in the eccentric grooves, until it is caught and thrown out. As this is done the approaching surfaces catch it and upset it. The leaf is then placed between the rolls and given the flat taper at the end. It may be noticed that the cam is placed upon the upper roll only. The face of the leaf that rests against the lower roll is, therefore, left straight. The shearing cutter is driven by an eccentric working in an open jaw as in the case of the nibbing machine, but without the sliding contact plate by which it can be stopped and started. The machine is driven by a 6-in. belt on a 16-in. pulley, keyed to a shaft upon which there are a 36-in. fly-wheel and a 7⅛-in. pinion, the latter meshing with a 32½-in. gear on the main shaft. The lower roll is driven by gearing, as shown in the front elevation.

The cambering machine, Figs. 8 and 9, is driven from a 4-in. pulley, keyed to the shaft O, making 80 revolutions a minute. Through a pinion and bevel gear, the vertical roller P is kept in constant motion. A secondary roller Q faces the first, and is forced out toward it by two springs. The master leaf is shaped to a template. The ends are held together and the rolls separated by the treadle and connection R. This moves to the right and permits the leaf and template to be inserted between the rolls. The pressure of the springs when the thrust of the treadle is removed bends the leaf to the shape of the template. The table over which the work is moved has a total length of 5 ft. 10 in., or 2 ft. 11 in. on each side of the center of the rolls, so that the leaf and template are supported throughout their whole length during their travel through the rolls, thus avoiding bending or crimping.

The tanks in which the tempering is done are ordinary steel tanks, with double sides and bottom. The space between the inner and outer walls is kept filled with water in constant circulation. This cools the crude oil contained in the interior and holds it at a constant suitable temperature. After annealing, the springs are straightened on the fitters' tables, and the several leaves of each spring are brought together. These tables are heavy blocks of cast-iron with a sloping pocket at one corner.

The hydraulic band-press is shown in Fig. 10. It consists of a heavy frame carrying two hydraulic cylinders, set at right angles to each other: one being vertical and the other horizontal. The two cylinders have each a working diameter of 10 in. and a stroke of 3 in. Beneath each piston there is a powerful spring, thus insuring a quick return as soon as the pressure is relieved. The piping and valves are so arranged that the two pistons can be operated in unison or separately.

The mode of operation is to hold the leaves of the spring in position with a clamp and slip the heated band in position. The clamp is then removed, and the whole put into the press, the top face of the band resting against blocking that has a bearing against the face of frame R. The two pistons with their attached rams are then forced against the band, upsetting it and tightening it against the leaves of the spring. This machine, while built at Altoona, does not differ from those used for a similar purpose by other spring makers, but is almost identical in the general design with those to be found elsewhere. With this exception, all of the machinery in the plant is peculiar to this establishment, and differs in all of its essential features from that in other establishments.

The spring-testing machine is of the ordinary type, and does not differ from other machines in common use. The last machine belonging strictly to the spring making department is the stripping machine shown in Fig. 11. This is an hydraulic press arranged to strip the old bands from springs that have been sent in for repairs. There is a cylinder 6 in. in diameter, at the left, the plunger of which is fitted with a U-shaped thrust-bar S, the ends of which are prevented from spreading by a bolt, and which is brought to a bearing against the band of the spring. The end of the spring abuts against the stop T, which is notched to accommodate the different heights to be operated upon. The tail-piece can be adjusted to the length of spring that is to be stripped, by means of the keys in the upper and lower tension bars. The spring is placed in the machine, in the position indicated by the dotted lines of the engraving, and when the water pressure is admitted to the cylinder the U-piece pushes the band off. The ram is drawn back by the weight attached to a chain as shown.

The air hoist is of the ordinary type, hung from a trolley and designed to lift and carry the comparatively light weights handled in the department. The paint spraying machine is also one that is familiar to all, and deserves no special notice.

From this review of the Altoona spring plant it will be seen by those who are familiar with the industry, that the machinery and methods employed are those of a thoroughly efficient manufactory. Indeed, it is necessary that they should be so, in order to meet the competition of the regular makers. The officials find that they can make and repair cheaper than they can buy.

The "Sargent" Coupling.

Discussion of the question of closing the link slot and pin hole in the M. C. B. knuckle has shown that the chief difficulty in the way of closing these openings, now that the automatic coupler has come into general use, is to provide means for pulling cars off sharp curves where they cannot be coupled in the usual way. So long as the knuckles have the slot and pin hole these couplings can be made with links and pins, but the advantages of solid face knuckles are so great that there can be no doubt that they will soon come into general use. A coupling which can be used with solid knuckles on sharp curves has been devised by Mr. W. D. Sargent which will be put on the market by the Railway Appliance Co., Old Colony Building, Chicago. It will be known as the "Sargent" coupling.

It will be seen from the accompanying engravings that this coupling consists of two cast steel jaws which

The Sargent Coupling for Solid Knuckles.

are designed to fit over the coupler arm directly back of the trunnion, being held in place by the locked knuckle. A 1-in. chain, 16 in. long, connects these two jaws and passes around the inside face of each knuckle. The chain is so attached that in slacking it hangs down, and out of the way should the couplers come in contact. This coupling weighs about 65 lbs., and its strength has been pretty thoroughly tested in heavy switching service about Chicago. It is held that by carrying Gilman-Brown emergency knuckles in cabooses and the Sargent coupling on engines, railroads will be able to use solid face knuckles without inconvenience or delays.

Iron and Steel Prices in 1900.

The spring months of 1900 witnessed a sharp and general decline in iron and steel prices, and most prices continued to decline until October, when slight advances were established, which have thus far been maintained. Steel rails, however, formed an exception to the general decline in prices in 1900. The price, $35, that had been established by agreement in October, 1899, was maintained until September, 1900, when it was reduced to $26, which is the present price. Notwithstanding the great decline in prices in 1900 and the blowing out of many furnaces and the closing of many mills in the summer months of that year, due to a shrinkage in demand, the production in all leading lines in 1900 did not very greatly differ from that of the boom year 1899; in some branches the production of 1900 was probably greater than that of the preceding year. In the closing months of 1900 production, except in pig iron, was virtually as active as at any time in 1899.

Average Monthly Prices of Iron and Steel, 1899 and 1900.

	No. 1 fdry., Phila.	Gray forge, P'burgh.	Bessemer pig, P'burgh.	Rails, at mills, in Penna.	Billets, at mills, P'burgh.
1899—					
Jan.	$12.12	$9.89	$11.00	$18.50	$17.06
Feb.	13.25	10.87	11.69	20.25	18.87
March	16.00	13.29	14.77	24.80	24.25
April	16.50	14.50	15.06	25.75	25.25
May	16.60	15.07	16.32	25.20	27.56
June	18.62	15.94	18.70	27.25	31.87
July	20.37	17.50	20.45	28.25	33.80
Aug.	21.70	18.37	22.37	31.00	36.37
Sept.	23.50	20.90	23.85	32.50	41.50
Oct.	23.70	21.19	24.50	34.00	41.50
Nov.	25.00	21.56	24.69	35.00	39.00
Dec.	25.00	21.52	25.00	35.00	36.37
1900—					
Jan.	25.00	21.00	24.97	35.00	34.50
Feb.	24.50	21.25	25.00	34.20	33.10
March	23.62	20.90	24.90	35.00	33.00
April	23.19	20.50	24.90	35.00	32.00
May	22.60	19.12	24.90	35.00	28.90
June	20.00	17.80	21.16	35.00	27.25
July	17.75	15.50	17.00	35.00	21.00
Aug.	17.20	14.00	16.07	35.00	18.20
Sept.	17.00	13.37	14.19	30.25	17.06
Oct.	16.00	13.00	13.37	26.00	16.80
Nov.	16.40	13.03	13.70	26.00	19.19
Dec.	16.50	13.32	13.75	26.00	19.75

—*The Bulletin.*

Progress of Two-Cylinder Compound Locomotives During the Past Ten Years.

BY C. J. MELLIN, *Chief Engineer Richmond Locomotive Works.*

During the last decade a greater stride forward has been taken in the design and construction of the locomotive engine than during any other since the commencement of railroad and locomotive building in this country.

In the case of the single expansion engine, the general line of progress has lain in the development of higher steam pressures and enlargement of the locomotive; a movement that started at about the time of the introduction of the double expansion principle of steam (compound) in railroad service, though the latter is unquestionably, to a great extent if not entirely, responsible for the change.

It may be considered that no real effort to introduce the double expanding principle in the locomotive engine was made more than about ten years ago, when it presented itself as an interesting and serious problem, in which not only the imperfection of the machine itself had to be overcome, but also the external obstruction and prejudice that is invariably encountered in the introduction of every radical innovation. A possibility of securing a saving in fuel of about 20 per cent. with a successful application of the compound principle in the locomotive engine was of such importance that its advocates were not discouraged by the numerous, though not unexpected obstacles of different natures which presented themselves.

The first requirement was the application of a reliable starting device as being the most essential feature in a compound locomotive; this demanded an earnest consideration and was successfully met,* as it gave the compound not only an equally reliable but a starting power superior to that of the simple engine, a point that will be referred to further on, while the working of the engine under steam was as perfect as could be desired, especially for moderate speed and in freight service. Carefully conducted tests demonstrated, to the complete satisfaction of the interested parties, that the expected saving could be realized, not only in fuel, but also in water on account of the better utilization of the expansive property of the steam, as well as because of the slower rate of evaporation whereby there was less crowding of the boiler.

Among the troubles that made an immediate demand for improvement was that caused by running the engine down grades with the steam shut off. This proved to be a very serious matter since the large amount of air required to follow up the low-pressure piston for an easy rolling of the engine was discharged through the exhaust nozzle, resulting in an unnecessary consumption of fuel, and still worse, a steam generation, when not required, that in some instances greatly exceeded the relief capacity of the safety valves. By letting a required amount of steam into the cylinders in lieu of air, the conditions were improved but very little, and a passage between the ends of the cylinders suggested itself as the only reliable means of overcoming this difficulty.

Such a passage controlled by a pair of by-pass valves† that automatically closed and opened at the proper moments was then applied with marked success, and practically removed this serious objection to the compound locomotive and a smoothly riding and rolling engine was obtained. It was further observed that there was a tendency for soot and smoke-box gases to enter the low-pressure cylinder in rolling down hills, especially if the reverse lever was not placed in full gear, a matter that called for a remedy. This was corrected by the application of an air passage connecting the main exhaust port with the atmosphere on the side of the cylinder saddle, which passage was controlled by a check valve which closed upon opening the throttle the same as the steam chest relief valve. This passage admitted fresh air into the cylinder if suction from the exhaust should take place, and served as an outlet for expelling any excess of air that was discharged from the cylinder, thereby eliminating the evil effects caused by drawing soot into the cylinder and aiding the by-pass valves to prevent an undue draft on the fire in running with steam shut off.

*See *Railroad Gazette*, June 15, 1894, page 422.

†See *Railroad Gazette*, June 9, 1899, page 401.

The engine seemed now to be all that could be desired at moderate speed, but by pursuing the investigation it was discovered that the power was diminished rapidly as the speed increased above 35 or 40 miles an hour, and the saving in fuel became less in about the same proportion when using the ordinary slide valve which indicated the necessity for improvement of the steam distribution in the low-pressure cylinder. All existing methods were considered, but each was objectionable. A piston valve of the required size would have increased the clearance to a serious extent, and the double ported marine valve would be out of question, as it would have been too heavy. The Allen valve would fill the requirement for admission, but a quick exhaust was of more importance.

The advantages gained by a negative exhaust lap showed that a double exhaust port during the first part of the exhaust period would be of equal value as if it were double throughout, because at the time the crank passes the center the main exhaust port is more than ample, since it at that moment largely exceeds the exhaust nozzle in size, and is then rapidly increasing.

By taking advantage of these conditions, it was found that the auxiliary port in the Allen valve** could be so arranged that it could serve the double purpose of both admission and exhaust port. The application of this valve proved a decided advantage both in speed and hauling capacity at speeds from 15 miles an hour and upwards, the gain increasing with the increase in speed over the plain valve to the remarkable extent of the following figures obtained in a test of an engine originally provided with a plain valve which was afterwards replaced by a double-ported valve without any further change of the engine.

About 5 per cent. at 100 revolutions per minute or equals 15 miles an hour.

About 14 per cent. at 150 revolutions per minute or equals 22½ miles an hour.

About 27 per cent. at 200 revolutions per minute or equals 30 miles an hour.

About 44 per cent. at 250 revolutions per minute or equals 37½ miles an hour.

A maximum speed of 420 revolutions per minute, or a piston speed of 1,820 ft., has been recorded with the double ported valve.

With these improvements all real objections were removed, and the compound is now far superior to the simple engine in the handling of the train in addition to its economical advantages.

Parallel with these investigations, other external conditions presented themselves, which have militated more against the progress of the compound than the actual defects of the machine itself, and which will probably explain the hesitation on the part of the railroads in its more general adoption, and it may therefore be of interest to refer to them.

Up to the time of the introduction of the compound it was generally considered good practice to allow a certain power margin or reserve power of the engine in fixing the rating of its load. With this in view, the cylinder sizes of the compound were made so that no margin was needed for the engine in working compound, as the provision made for working the engine as a simple machine, in emergencies, gave an excess of power that was more than ample for this purpose. This worked very well for a few years, but step by step the margin of the simple engine was reduced, and it became necessary to work the compound as a simple engine to an extent that was detrimental to its economy in order to keep up in hauling capacity, with the increased load of the simple engine, and its former good reputation declined.

Large cylinders of higher boiler pressure, the only way out of this dilemma, was simple enough for future engines, but those in service continued to haul down the reputation of the compound even after those with enlarged cylinders had greatly improved upon the original records. Some fear was at first felt of overcylindering the engine when working simple, but, upon investigation, it was discovered that 33 per cent. of the weight on the drivers could be utilized for tractive power when so working without slipping. This removed all hesitation as to making the cylinders of such size that 24 per cent. of the weight on drivers was obtained as tractive power when working compound or equivalent to that of the simple engine, and 30 per cent. (= 25 per cent. increase) in emergency when working simple.

The explanation of the fact that such a high percentage is available in working simple may be found in the manner in which the steam is supplied to the low-pressure cylinder, namely, that the small opening controlled by the reducing valve allows the maximum pressure merely to follow the piston at a low and even motion and drops instantly if the wheels should loose their grip on the rail. Consequently they regain their grip after an insignificant movement of the piston when the pressure again quickly rises to its maximum allowed by the reducing valve (which in the low-pressure cylinder is about 40 per cent. of the boiler pressure) without any manipulation of the throttle or even any notice on the part of the engineman. With these proportions (24 per cent. and 30 per cent.) between the tractive power and the weight on drivers, a great step was gained for the compound both in economy and ease in handling the trains, etc., and an additional advantage over the simple engine was discovered that had not previously been noticed, which in importance probably eclipses all others, namely, the effect on draft gears and cars in starting.

The increased load on the simple engine has practically deprived it of all spare power, and where the rated load is not governed by an exceptionally heavy grade it cannot start its train without taking "slack," and this under the greatest possible acceleration to gain momentum enough with the front end of the train to aid in starting the rear. Car after car may be jerked from dead rest to a speed of 6 or 7 miles an hour in an instant, a proceeding which overstrains the couplers. A repetition of this process at every start dooms both draft rigging and car to destruction, a fact which is too familiar to every railroad man to need any further comment. The starting of the compound is decidedly different in this respect as its starting power is from 20 per cent. to 25 per cent. greater than its normal hauling power. At the same time the acceleration is less while working with this excess power so that the momentum to be obtained by taking up the "slack" is unnecessary, while the start cannot be made with the same violence as with the simple engine, even if the slack should be needlessly utilized for this purpose. The shocks and jerks in starting are probably the most destructive part of the service for both cars and couplers, and are responsible for the great amount of time and attention, that must be paid to the draft rigging in general, which, if not overstrained, would be limited to that of ordinary wear.

The tendency to load the engines to the stalling point was also spreading to the compound, which meant about 20 per cent. more than its normal load or equivalent simple engine, and in the decision that the compound should be loaded to its maximum in working compound, having the simple feature for emergencies, the argument was advanced that as the compound can haul a given load when working simple she would haul this load if she were a simple engine. This statement appealed very forcibly to those who were not in position to know that an equivalent tractive power of 30 per cent. of its adhesive weight is not obtainable by a simple engine, and the very essence of virtue (if such an expression can be applied to an engine) was turned against the compound as a serious objection. It is needless to point out that the first of these "external" objections had no relation to the compound principle, and the last is a misconception of real merit instead of a fault.

The repair item has fluctuated somewhat in comparison with the simple engine. When it has been in excess it has generally been due to some special reason, such as local weakness of the structure or misuse of its emergency power where no provision for this power has been made. Where the compound engine has been properly designed the repairs have been less than for the simple engine because of the more uniform pressure distribution in the cylinders, the constant turning moment of the same, the lesser forcing to which the boiler is subjected, the lower maximum heat with less variation in temperature and consequently the smaller variation in expansion and contraction.

In connection with the milder draft to which the fire is exposed in the compound fewer sparks are thrown than with the simple engine, and those that are thrown are so small that they do not contain heat enough when striking the ground to ignite. This is an item that cannot be over-estimated, especially in localities where fires are liable to occur, since a reduction of the chance of setting fire to property along the road by from 60 to 70 per cent. would alone more than warrant the replacing of the simple engine with compounds, which might well save their cost several times over in a single season.

Furthermore, it may be mentioned that the balancing of the slide valves of the compounds does not present such a serious problem as that of the simple engine at high steam pressure, since the receiver pressure counteracts the load on the high-pressure valve (except when working simple when there is no receiver pressure), and the low-pressure valve is at no time exposed to more than 45 per cent. of the boiler pressure.

The size of boilers and fire-boxes is a question which has come to the front very prominently of late; a problem, the solution of which is much simpler for the compound than for simple engine. Every means have to be resorted to, to obtain a sufficient grate area and size of boiler for modern simple engines. Nevertheless, the efficiency becomes less as the engines are enlarged though the hauling capacity is increased, because the size of the boilers has practically reached its upper limit. Even with smaller engines, weight and other causes are constantly tending to hold down the size of the boiler so that its efficiency falls below what should be called normal. For an equivalent compound the same boiler will, under all circumstances, have a considerably higher efficiency both by the more moderate working of the same and the excess of work obtained by the better utilization of the expanding property of the steam which it produces, than that of a simple engine.

Having thus briefly reviewed the progress of the compound locomotive in its evolution to its present state, whereby it will be seen that all of its earlier defects have been removed, and the imaginary objections obliterated, its advantages over the simple engine may be summarized as follows:

First.—About 20 per cent. saving in fuel consumption.

Second.—About 16 per cent. saving in water consumption.

Third.—Fewer water stations to maintain.

Fourth.—Gain in time on road owing to fewer stops for taking water.

Fifth.—The ability to develop 20 per cent. increase in power in emergency to prevent stalling if its rated load should be exceeded.

Sixth.—The possibility of realizing 30 to 33 per cent. of its adhesive weight for tractive power in starting and in emergencies.

Seventh.—An inestimable saving in the maintenance of the draft gears and rolling stock and in its ability to start without the utilization of the destructive "slack."

Eighth.—Far less risk of setting fire to property along the road by the practical absence of the ejecting of ignited sparks from the stack.

Ninth.—Saving in repairs of the engine on account of less strain on boiler, and less slipping of the engine in starting due to the more uniform turning moment of the cranks.

Tenth.—Longer services on the road by being held less time for repairs and a prolonged life of the engine.

Eleventh.—Easier in firing to the extent of the fuel saving, and a more comfortable riding engine.

The seventh and eighth of these items are of such a nature that their value cannot be properly recorded, but that they are considerable needs only a fair judgment and experience to comprehend.

Unquestionably there will be room for still further improvement on the compound as in everything else, but its superiority over the simple engine, as here enumerated, is indisputable, and cannot be disproved by references to earlier or experimental compound engines, as they have established their records on a number of railroads which have the fully developed compound locomotives in service.

The advantages of the compounds are certainly of so great a magnitude that every railroad man in the country and everyone else interested in railroads and engineering should give the subject their cordial support and acknowledge its merits, as nothing along these lines has ever been successful where it has had to work its way against the ill-will of the operators; and those roads that have given their support for the necessary experimental work in its introduction deserve a great deal of credit from the entire railroad fraternity for the aid they have given in bringing this important problem to a satisfactory solution.

**See *Railroad Gazette*, Aug. 18, 1899, page 580.

The "Gibraltar" Bumping Post, Style B-2.

To meet a demand for such a device, the Drexel Railway Supply Company, Fisher Building, Chicago, nearly a year ago designed and placed on the market the "Gibraltar" bumping post, which was illustrated in our issue of Oct. 26 last. This has been received favorably by many railroads throughout the country, and the service under all various conditions has proved that it will meet all ordinary exactions, however severe. However, it is not claimed for this post that it will stop everything that may come in contact with it, and there have been two instances where the "Gibraltar" post has been destroyed. But in both cases it was where a heavy train with the engine attached and under steam came in contact with the post at excessive speed, and no claim was made by the railroads in either case that there had been a failure of the post.

In pursuit of the policy to carry the design of the "Gibraltar" to the highest development, the Drexel Company has recently brought out a new design which is shown herewith, and which is a modification of the first one adopted. This is known as "Style B-2." In this design the ground rails are carried to the rear of the head at the full gage of the track. The brace rails are so applied as to provide resistance at each corner at the back part of the head. The blow delivered by the present style of automatic coupler, is to the right of the center line of the post, and the application of the brace rails is to meet and overcome any twisting or torsional strain which may be brought upon the head. The other features, including the 1½-in. "U" bolt which connects the head and the anchor rail underneath the ties, as well as the tie rods, are the same as in the first design.

Another new feature of interest, in the construction of this post for passenger service, is the use of the McCord spring dampener, which is placed between the striking face plate and the head of the post, and replaces the block of wood used in the post for freight service. The advantage of this device is, that being made up of a combination of heavy steel springs and friction plates, a yielding resistance is offered, and the force of a blow is largely absorbed before it reaches the post itself, with the result that the efficiency of the post is very materially increased and with much less damage to either cars or post. The use of wood is practically done away with; no excavation is necessary, and the services of a bridge gang are not required, but it may be erected by section men. Another important feature is that it may be removed easily and quickly when found necessary to change to some other location.

The legislation for the Swiss State Railroad system, which does not come into the hands of the state for some time yet, provides for the election by the several canton governments of certain advisory officers, whose chief duty will be to let the State Administration know what the public wants. It was designed that these places should be filled by representative manufacturers, merchants and farmers. Most of the canton governments have already made their selections, and nearly all the men selected are members of the canton governments themselves, instead of leading shippers of freight. That is, the canton officers have selected themselves, allured, probably, by the free pass which will be the chief compensation of these counsellors.

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advetising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Railroads in Cuba.

When we contemplate Cuba with some knowledge and a reasonable imagination we find it one of the most interesting spots on the globe. The island lies at the very doors of the richest and most enterprising of the nations, of which nation it has suddenly become the ward. It lies in the track of great currents of commerce and has numerous commodious and safe natural harbors. It is said indeed that no other coast line of the same length has so many good harbors. It has a fertile soil and no desert areas. It has abundant rains, numerous running streams and a climate favorable to vigorous vegetable life. This great island, with an area of 45,000 square miles, a varied topography and a beautiful winter climate is destined to become a garden, and before many decades pass, the shores of its ample bays will be lined with thriving towns, and on the hills overlooking them will be the winter palaces of rich men from the United States and Canada. In the interior a prosperous and contented population will work farms and mills and mines and build towns where now is the wilderness.

All of this and much more must happen. But how soon it will happen; who will own the farms and build the towns; whose ships will lie in the harbors and whose palaces will line the seaside hills—all these matters depend a good deal on the wisdom of the people of the United States who have undertaken to liberate and redeem Cuba and to start her in the way she should go.

It is so obvious as to be commonplace, that after good government the most powerful element in the development of these islands must be the railroad. Abundant means of cheap transportation must lie at the bottom of any substantial and wide prosperity for the islands. We need not stop now to try to illustrate or prove these statements; no doubt our readers accept them. But railroads must be provided by money from outside of the islands, and that again is obvious. Furthermore, those who invest in Cuban railroads must be prepared to wait a long time for interest on their investment. The island has always been poor and thinly peopled notwithstanding its favorable natural conditions, and now after the recent years of war the population and wealth are further reduced. This sparse and poor population cannot contribute much tonnage or pay high rates. The island must be nursed into prosperity by a railroad policy that can afford to wait for returns, and this implies ample rights now and reasonable security for the future. And so we come around again to the proposition that the speed of the development of Cuba and much of its direction depends upon the wisdom or unwisdom of the present protectors of the island, the people of the United States.

Perhaps it will be granted by most people that the ideal railroad conditions for Cuba would be the ownership of all the railroads by one strong company that could build and work a rational system, laid out and operated to develop, with the greatest speed, the country and its harbors. Obviously, this system would have a continuous trunk line from end to end of the island with numerous laterals reaching the coast at convenient ports. Some such plan as this is, we judge, now in contemplation, but in the way of it stands recent law of the United States.

In Cuba, according to the Spanish law, the railroads are divided into three classes; first, railroads for general service and public use; second, railroads for private service and public use; third, railroads for private service and private use. The first one carries the right of eminent domain or forcible expropriation, it being considered as of public utility. But this class of railroads cannot be built now on account of the act passed something like two years ago which bears the name of Senator Foraker. That prohibits the American authorities in Cuba from granting concessions or exclusive privileges. Its first result was to protect American officials in Cuba from the multiplied importunities for privileges, concessions, charter rights and monopolies which came in clouds at a time when every energy was needed for bettering immediate and serious social and physical conditions. But later it became apparent that the resolution stood in the way of legitimate enterprise and worked to discourage investors and to delay the industrial reconstruction of the island, and the Government at Washington was urged to modify the strict terms of the law. The military authorities had (as doubtless they were bound to do) given the strictest construction to the law, so that even a small ferry concession to run a ferry-boat across a stream was refused. It seemed to be practicable to mitigate the severity of the law by instruction from the administrative authorities so as not to interfere with projects of manifest use. We do not understand, however, that any considerable amelioration of the action of the law has been secured, and so the building of the trunk line, or of those parts of it immediately contemplated, has been a matter of considerable delay and uncertainty. The company which is working seriously in this direction has bought most of its right of way, but it cannot go far without crossing highways and streams which are public domain, and formal permission to cross these cannot be had under the Foraker law. Provisional permits have, however, been granted by the Secretary of Public Works with the approval of the Governor General, these of course being subject to revocation. Such in brief is the legal situation, from which a way out must be found.

Notwithstanding this unfortunate situation the company to which we have referred, namely, the Cuba Company, is proceeding fast with a great scheme. The eastern Provinces of the island, namely, Santiago and Puerto Principe, have almost no railroad. The Cuba Company has started a line in Santiago from San Luis, the terminal of the Santiago railroad, running westerly by Bayamo and Tunas in the direction of the long axis of the island. In the Province of Santiago it will build two branches, one to the Bay of Nipe, on the north coast, and one to Manzanillo, on the south coast. The line to Nipe is now considered a part of the main line, for it is proposed to make a great shipping terminal on the bay. This bay is said to be the largest in the world and on its shore the company has acquired something like 20,000 acres of land. Indeed the company has land in other parts of the island, a part of its scheme being to exploit the natural resources of the island and its ports as well as to work railroads. This seems to be a necessary plan for it seems to be the only way by which tonnage can soon be developed. The company has also begun work at points further westward, namely, at Ciego de Avila, in the Province of Puerto Principe, and at Santa Clara, in the Province of the same name. If one will look at the maps he will see that these points lie approximately in the long axis of the island, and so we judge that the work there begun is part of the general scheme of a continuous trunk system.

It is apparent that as the company proceeds westward it will encounter a new kind of difficulties. From Santa Clara (a little west of the middle of the island) to Pinar del Rio, near the western end, there are five important railroad companies. Three of these belong to two English companies and two are mostly owned by Spaniards. For two years negotiations have been pending for the purchase by the English companies of the Spanish roads, but so far we believe these negotiations have not succeeded. We have understood that there is an agreement under which the Cuba Company will not build west of Santa Clara while the owners of the existing railroads will not build east of that city. Concerning this agreement and policy we have, however, no precise knowledge, but it would not surprise us if the Cuba Company should, sooner or later, become the owner of all of the railroads, which, from our point of view, would be an excellent outcome.

Two Collisions Under the Block System.

One of the unwritten laws of railroading is that the schedule of a train gives it the right to the road only once; that to move the train backward, even a short distance, some authority is necessary besides that given to it by the time-table. We say unwritten law; but perhaps not every reader will assent to the statement. By "unwritten law" people generally mean a law which is so universally recognized that it is always obeyed as well as though it were written; but every now and then there occurs a collision which shows that this unwritten law is not accepted everywhere.

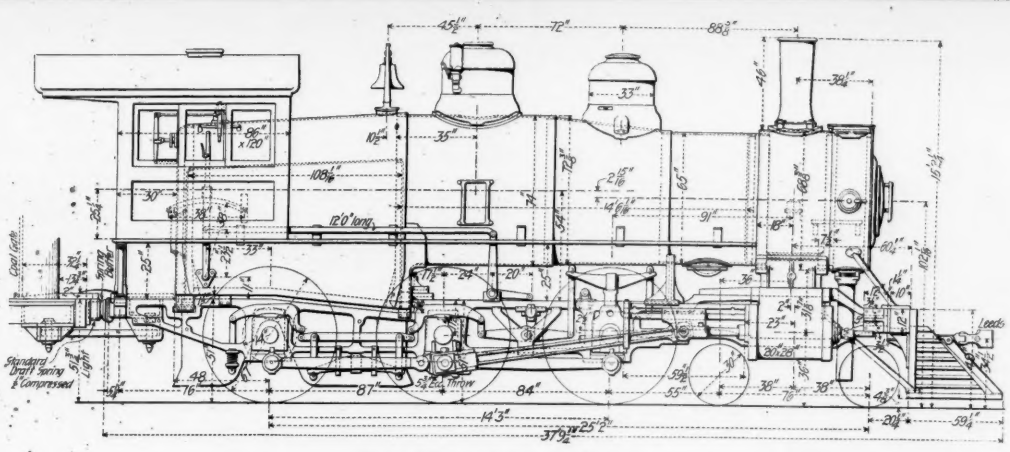
At Oriskany, N. Y., recently, the engineman of a freight train who had passed, or thought he had passed, a stop signal at a block station, pulled up as soon as he realized that he might be running into danger, and set back as fast as he could; and having got his train back into the block section which he had just vacated, it was run into by a following train, which had been admitted to block *A* when the foremost train passed block *B*. Several cars were smashed, but no one was hurt.

We have never found out why this law is not incorporated into the rules. Probably in large measure because in many situations the law seems not to be required, for the reason that it can be broken with perfect safety. But the same is true of the flagging rule, which has been the subject of so many ten-hour discussions. Possibly the difficulty of getting a satisfactory flagging rule is what has led superintendents to steer clear of any difficulties of this kind which are not absolutely forced upon them. The requirement that the train must not be backed is, however, an implied concomitant of the flagging rule, and, no doubt, many superintendents would say that the implication is so clear that there is no need of a specific clause.

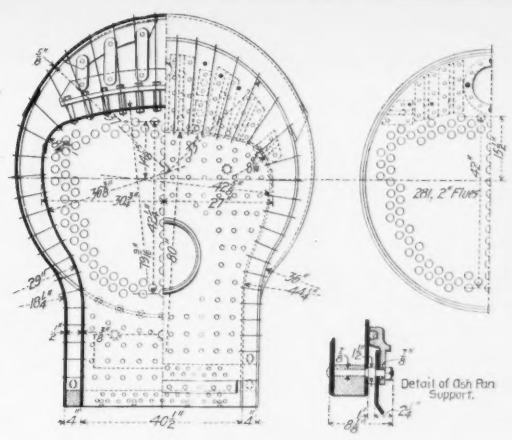
Some block-signal codes have a rule that a train, having passed out of a block section, must not be backed into it. This is good as far as it goes; but unless permissive blocking is absolutely forbidden, at all times, the prohibition of backing is required within 1,000 ft. or 100 ft. of the outgoing end as well as at every other point.

The collision which we have noted above calls to mind a similar collision (with passenger trains instead of freights) that occurred in Germany, last November, in which 12 passengers were burned to death. The collision itself was remarkable; but the defense or explanation of the Government railroad officers was even more remarkable, and the reader will be interested in a few passages from an account of the case in the *Zeitung des Vereins*, prepared by one of the higher railroad officers. This account says:

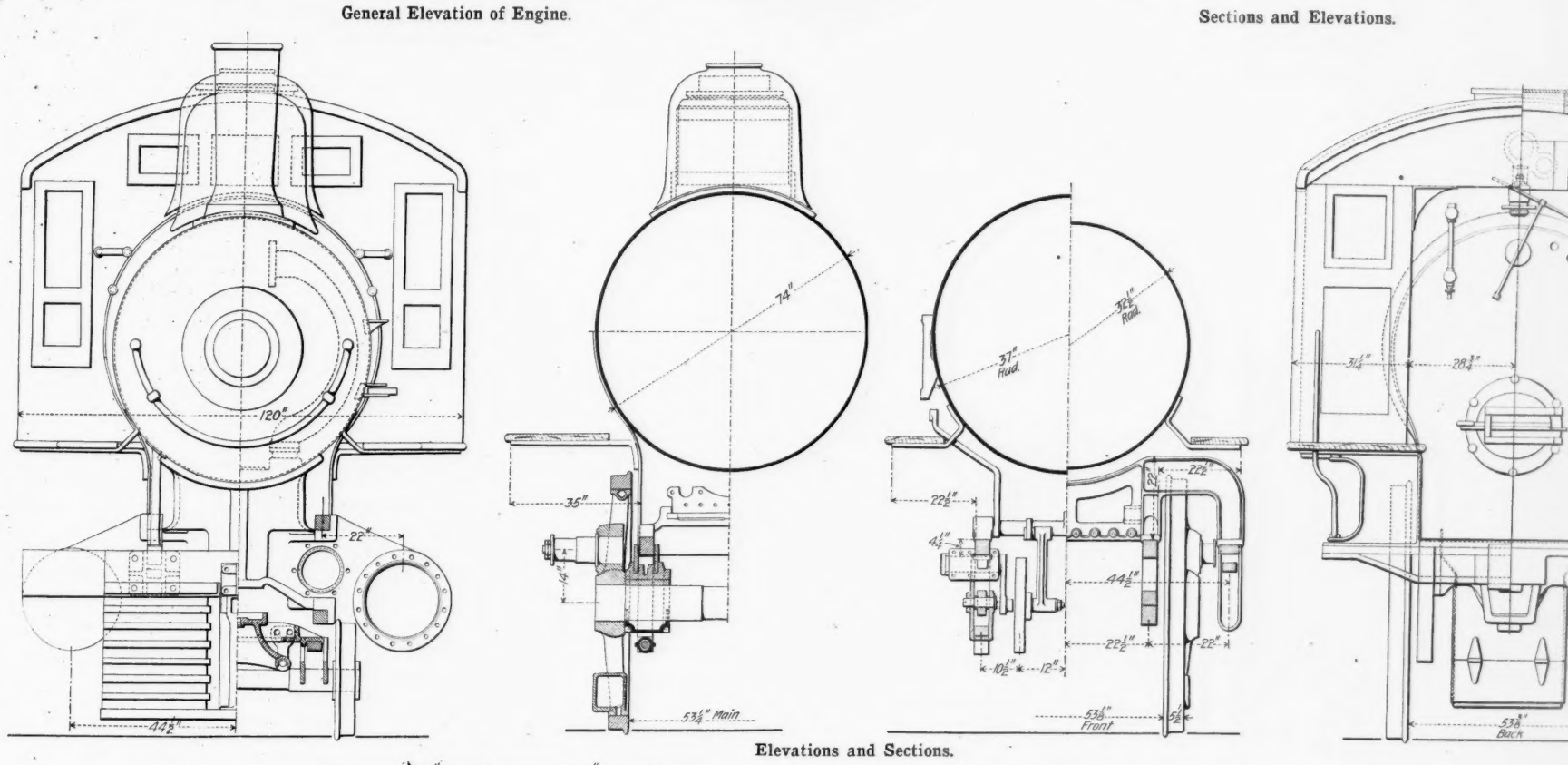
Between Offenbach and Mühlheim-on-Main, 6 kilometers apart, on the double-track Frankfort-Bebra line, stands block station No. 11, about 3 km. from Offenbach. The line here lies in a long tangent. The trains in collision were No. 42 and No. 238, running from Mühlheim to Offenbach. The time was Nov. 8, about 10:25 p. m. No. 42 was 11 minutes late, and was held at Mühlheim two minutes because of an empty engine in the block ahead. At block station 11, on account of the thick fog, the engineman did not see the signal until he was within about 30 ft. of it. He put on brakes at once, but the train, consisting of the engine, a combination mail and baggage car, a dining car and two passenger cars with entrances at the ends, a passage from platform to platform (not in the center, but on one side), had passed the signal about an eighth of a mile before it came to a halt. The rear end of the train was then out of sight of the signalman, in the fog. Just as the train passed the signal, Offenbach notified block 11 that the road was clear, and the signalman followed the rule that when the end of a train has passed his signal he shall open the section back of it, and signaled "line-clear" to Mühlheim. But the engineman of train 42 in his uncertainty determined to back up to the block station. As the backing train appeared, the signalman recognized the danger immediately, and, running towards the train, shouted to the engineman to go ahead as quickly as possible. But the engineman could not start forward quick enough, and train 238 ran into the rear end of train 42. Its engineman, like the other one, had not been able to see the block signal or the tail signal of the through train until he was almost on it. The collision was severe. The partitions in the rear car were driven together so that the compartment doors could not be opened. Some sharp object punched a hole as large as a half dollar in the front end of the gas holder under this car, from which the strongly compressed gas issued in a long stream. This took fire from the engine of train 238, and immediately set that car on



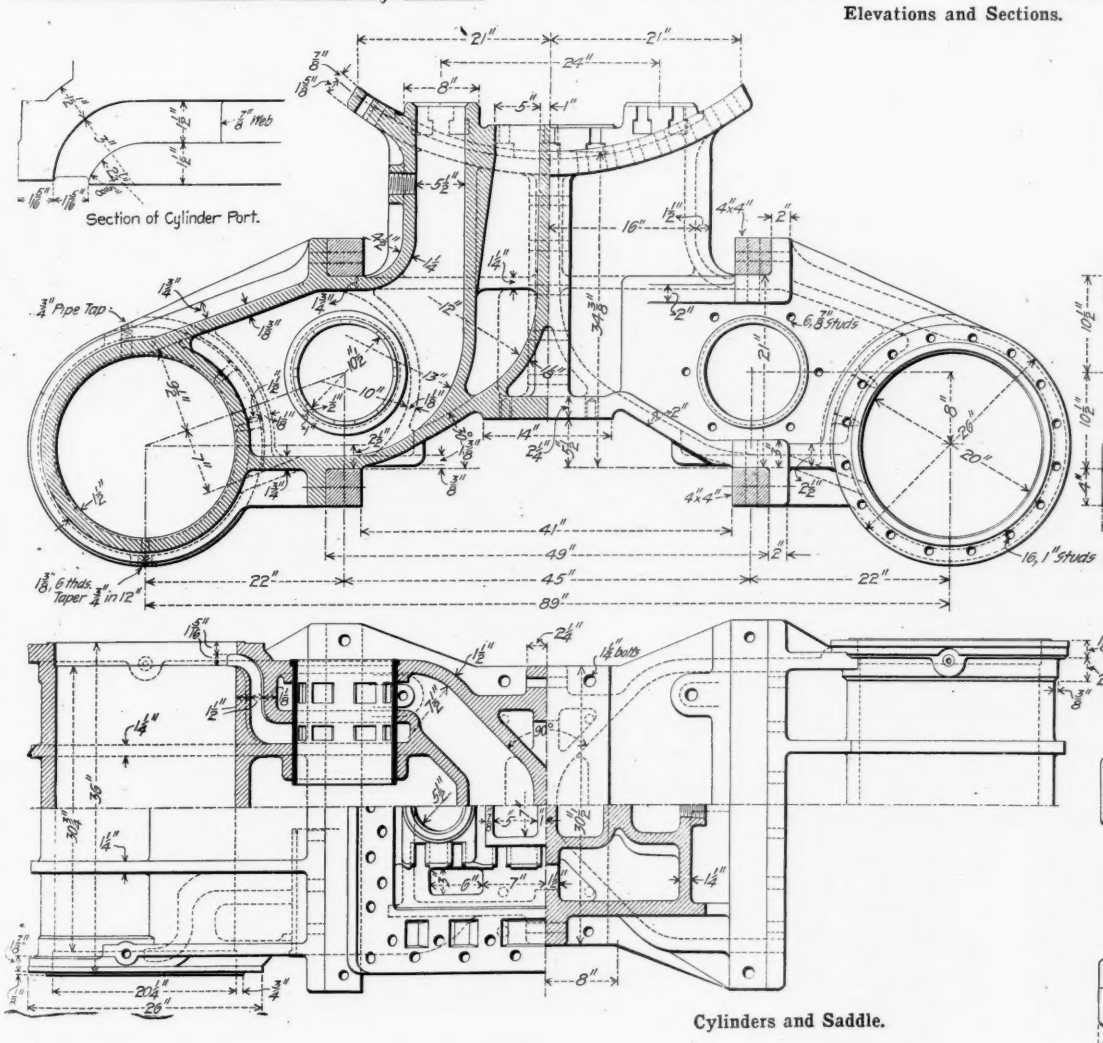
General Elevation of Engine.



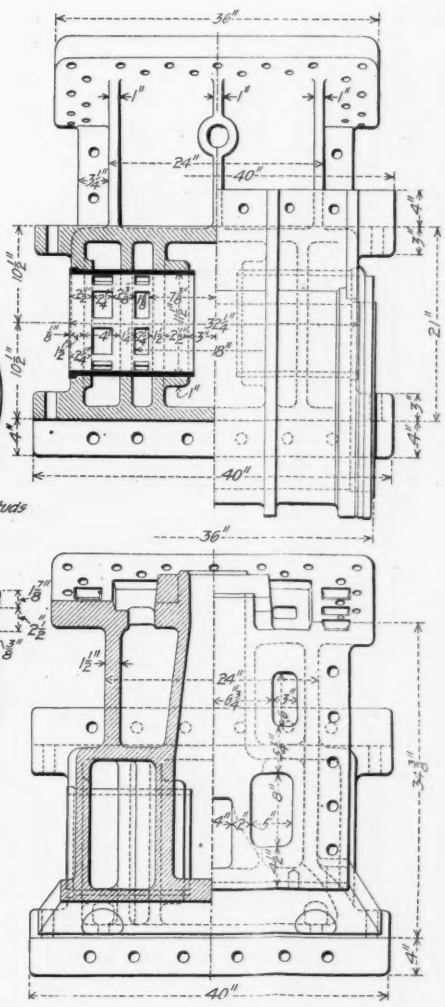
Sections and Elevations.



Elevations and Sections.

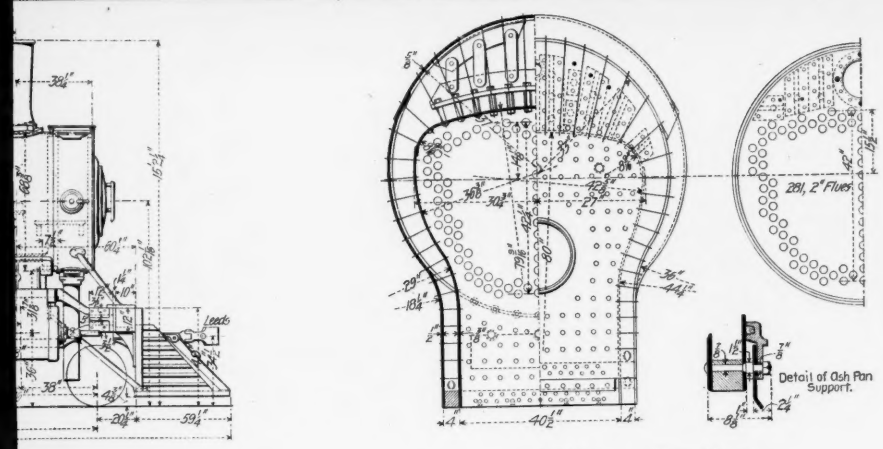


Cylinders and Saddle.

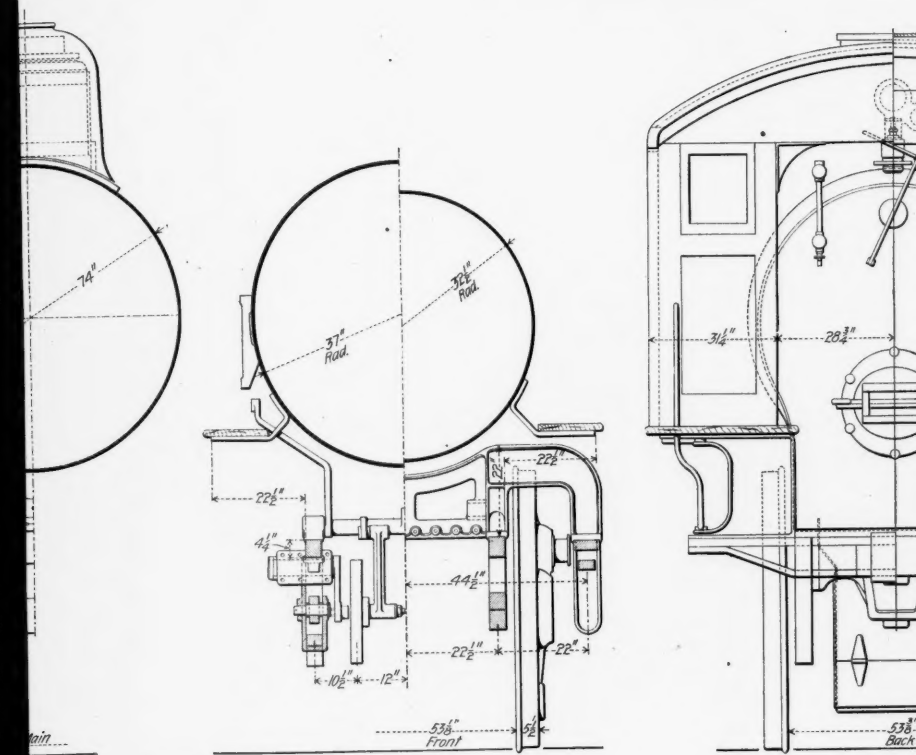


Built by THE INTERNATIONAL POWER CO., *Providence, R. I.*

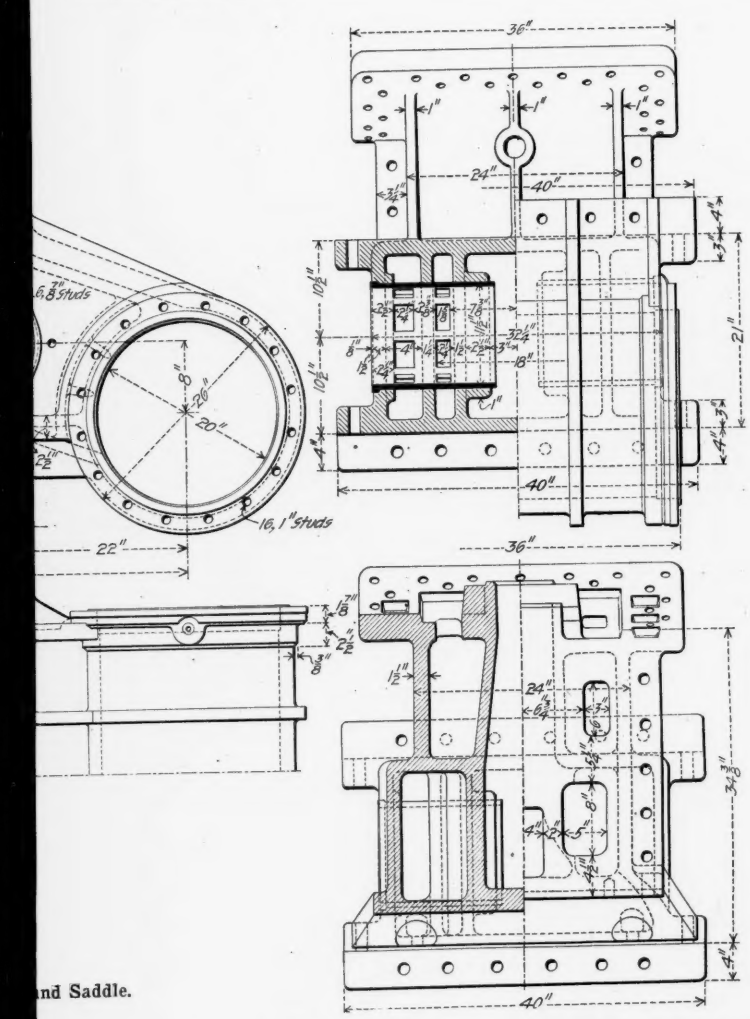
LATEST TEN-WHEEL PASSENGER LOCOMOTIVE OF THE ATCHISON,



Sections and Elevations.

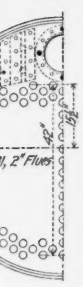


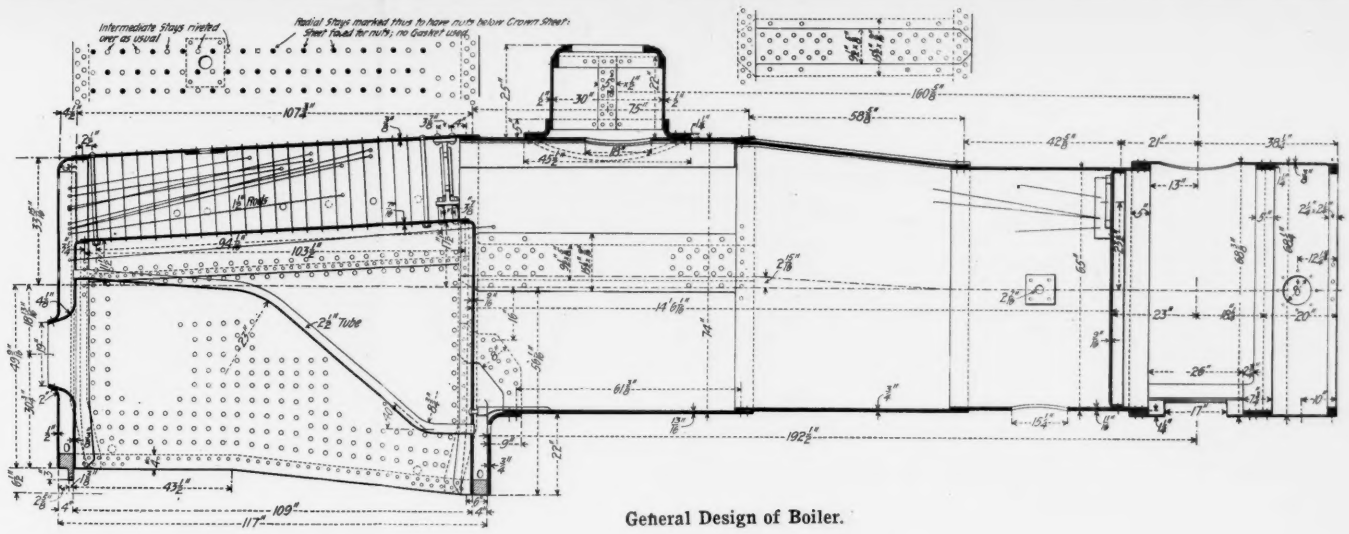
Elevations and Sections.



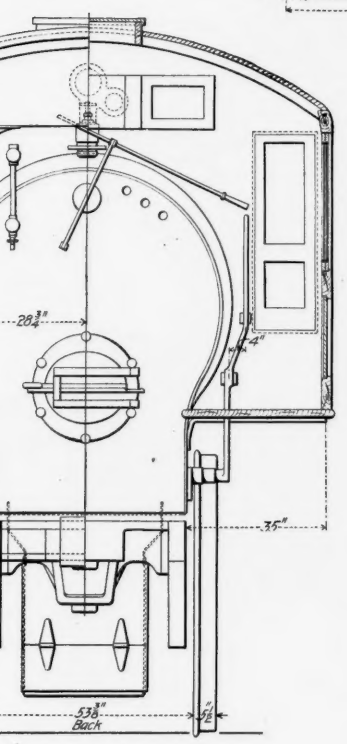
nd Saddle.

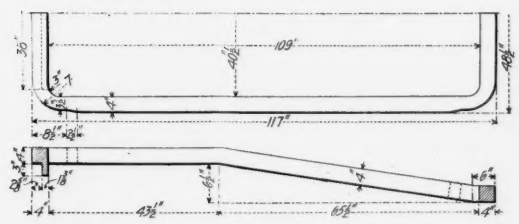
LATEST TEN-WHEEL PASSENGER LOCOMOTIVE OF THE ATC



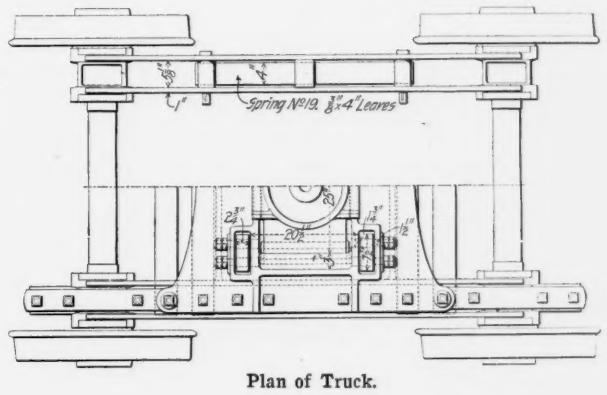

Intermediate Stays riveted over as usual
Radial Stays marked thus to have nuts below Crown Sheet: Sheet faced for nuts; no Gasket used.
14" Rods
2½" Tube

General Design of Boiler.

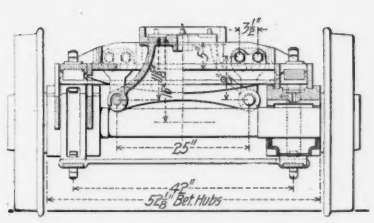


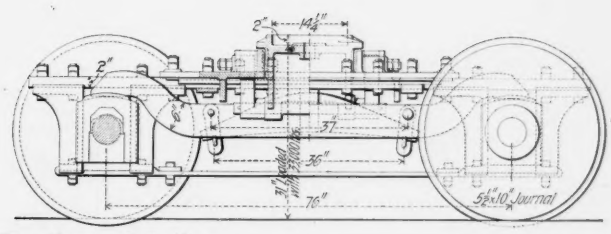


Mud Ring.

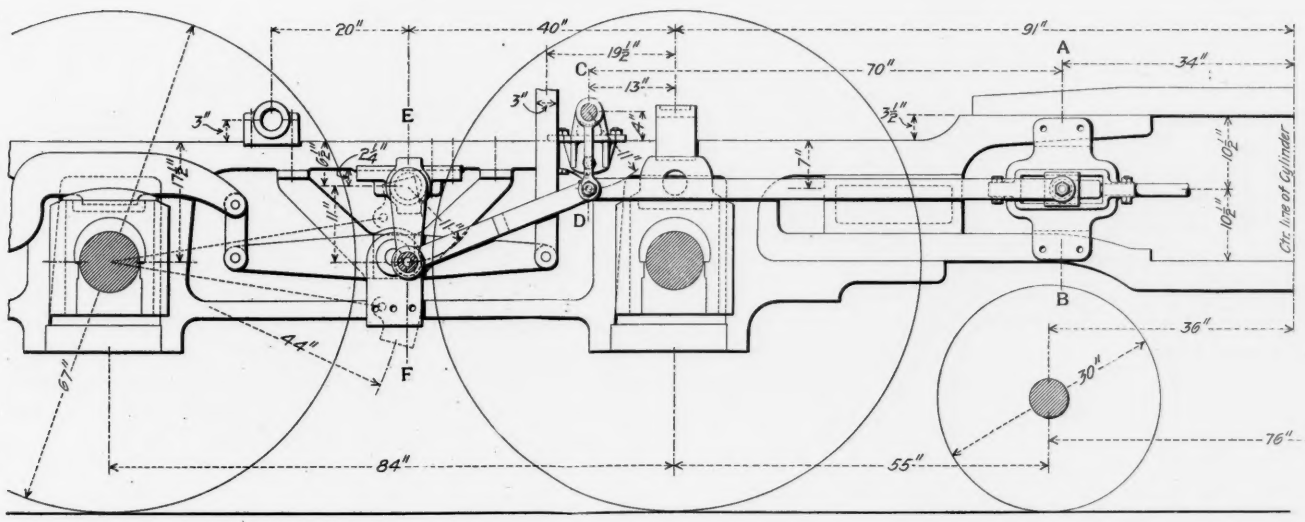


Plan of Truck.



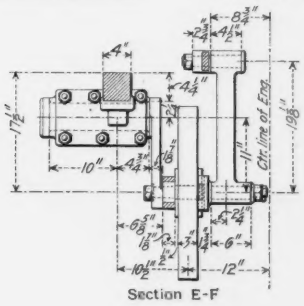


Truck Elevations and Sections.

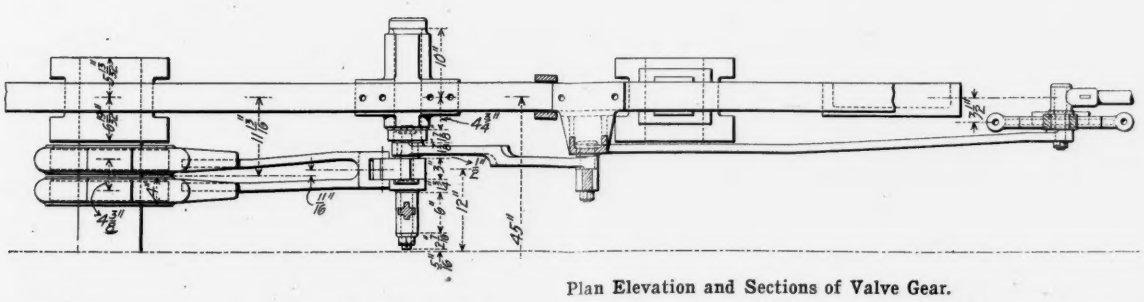


Section A-B

Section C-D



Section E-F



Plan Elevation and Sections of Valve Gear.

fire and also the one in front of it. All the occupants of the second car were able to escape; from the rear car six got out through the windows and the others, 12 in number, were burned alive. Four passengers also were injured and one brakeman.

An investigation by prominent officers of the Prussian State Railroads was held immediately, and also by an official of the Imperial Railroad Bureau, which exercises a certain supervision over the railroads of all the states in the Empire except Bavaria. Later the Prussian Minister of Public Works himself visited the scene of the accident.

An official statement (not the official report) says that "if the result of the investigation by the railroad authorities is confirmed by the investigations of the legal authorities, no employee concerned is to blame for the accident. All employees have done their duty in full measure. The accident is due to a concatenation of unlucky circumstances. First, the thick fog prevailing, which prevented the enginemen of both trains from seeing the block signal, and the engineer of the local train from seeing the tail signal of the express, and which also prevented the signalman from seeing that the express was backing until just before the arrival of the local train. Also, the fact that the express was behind time, which brought it at block 11 only 4 minutes before the local was due. Third, it must be regarded as unfortunate, though done with the best intentions and not contrary to any regulation, that the express was backed into the block section between block 11 and Mühlheim. Finally, a fourth disastrous occurrence, which was the chief cause of terrible results, was the lighting of the escaping gas."

The criticisms of the newspapers were numerous and varied. One comment is that if no employee was at fault the management must have been to blame. One paper condemns the use of gas, and demands electric lights, to which it is answered that the railroad authorities have carefully followed all plans of electric lighting and their progress, and have made many experiments with it; but as yet have found none which they feel justified in adopting, aside from the cost of equipping 8,000 express passenger cars. To the demand for audible signals the managers reply that there was no call for them, for "block signal 11 was not a danger point; it existed only to protect a dangerous section, running into which for a short distance is not dangerous." To the question why the block signal was not furnished with a distant signal, it is answered that the application of distant signals was first prescribed by the official "Regulations for the Main Railroads of Germany" dated Oct. 1, 1898; and that only for signals at the entrances of stations and halting places; and that the time for the universal execution of this rule does not expire till Dec. 1, 1903. Distant signals for block station signals are applied only in exceptional cases according to the Prussian State Railroad regulations; no need of such a distant signal had ever been felt at block station 11, until the day of the accident.

If ever a railroad officer made a more child-like defense of his conduct than that here recounted we have not heard of it. We can imagine that "a high railroad officer" who had no acquaintance with the engineering or the operating department might offer these reasons, if compelled to explain before he could consult someone who knew the true causes of the disaster; but that such primitive views should be formally published, even semi-officially, seems incredible.

For this killing of 12 passengers on a Government railroad seven excuses are given: (1) The fog was an unlucky circumstance; (2) the trains were late; (3) the backing of the train was done with good intent, and was not contrary to any regulation; (4) the gas was the worst element; (5) an audible signal was not required because block 11 was not a "danger point"; (6) a distant signal is not absolutely required until December, 1903; and, finally, all employees did their duty.

The only relevant answer in the lot is that concerning the gas; the management has faithfully followed the development of electric lighting and has not yet found evidence of its superiority to gas. But it does not appear but that the coals from the fire-box would have caused the death of the passengers even if there had been no gas on the train. Foggy weather may be a misfortune, but that is just one of the misfortunes that block signals are designed to provide against. If there were no fog there would hardly be any need of block signals on long tangents. The lateness of the trains is another thing which, if it could be avoided would make block signals almost unnecessary. If there was no regulation agaist backing into a block section, that simply shows the inadequacy of the code.

Audible signals were deemed unnecessary because No. 11 was not a "danger point." If a block station is not a "danger point," what is one? If a block station cannot positively warn enginemen to stop, it is not a block station, and the expense of maintaining it ought to be saved. We do not here argue for or against audible signals; but if such signals are to be used it is hard to see how any claim can be made that a block signal station enveloped in a fog is not one of the most suitable places to place them. It is true that many railroad men appear to think that an extra safeguard of this kind is more necessary at a drawbridge or a grade crossing than at a simple block station; and probably this view obtains in Germany as well as in America and England; but the reasoning which supports it is not very deep, for to establish a block station is, by the very act, to make that a "danger point." Ordering a following train not to pass a certain signal is equivalent to informing the leading train that it is safe from rear collision when beyond the signal. Thus encouraging the leading train to stop without sending out a flag makes the block station a "danger point." In discussions on rules this view has been controverted by the hour; and those who do not controvert it claim that the rules ought to be fixed so that it would not be true; but practice confirms it and makes it more and more true each succeeding year.

The question of the distant signal hardly needs consideration here. The management admits the need of such signals but appears to believe that three years hence will be soon enough to put them in.

We have no doubt that the Courts will hold that the engineman of train 42 was grossly negligent. The engineman of the other train was also grossly negligent for approaching station 11 so fast; and the account indicates that he would have caused a collision if the other had not; for he would have run into train 42 if it had been beyond the signal. A British Board of Trade Inspector would probably charge the signalman with exercising very poor judgment in not stopping to think of possible consequences when he saw the blunder that the engineman of No. 42 had committed. If he had reflected he would have waited, very likely, until he knew the whereabouts of that train, before permitting the next train to come on.

State-managed railroads have been accused of being less progressive than those managed by ordinary corporations, but this lack has been supposed to be in some degree counterbalanced by a conservatism which makes State railroads "slow and sure," with emphasis on the "sure." The circumstances of this collision show that our views may be in need of revision.

Railroad Gross Earnings for 1900 and for December.

From returns of 181 companies, covering 163,214 miles of railroad *The Chronicle* estimates the gain in gross earnings of the entire mileage of the United States in 1900 at $125,000,000. The increase for 1899 was estimated at $140,000,000, for 1898 at $90,000,000, and for 1897 at $75,000,000. This is an estimated improvement of gross earnings in four years of $430,000,000. The official returns comprise 113 roads for the full 12 months and 68 roads for 11 months, making 181 roads aggregating 163,214 miles. Their total gross earnings were $1,298,000,000, which was a gain of $99,500,000 for the same roads over the preceding year.

This gain is not due to increased crop movements since grain receipts show a shrinkage; it is rather due to the increased tonnage in merchandise and general freight. At the same time there has been an improvement in rates. The most serious adverse influence was the anthracite coal strike continuing from Sept. 17 to Oct. 29. Another adverse influence was the failure of the spring wheat crop in the Northwest. Receipts of wheat at Duluth during the 12 months fell in consequence from 54,750,000 bushels to 31,500,000 bushels. Grain receipts of all kinds show a falling off for the year. At the seaboard there was a loss of over 50,500,000 bushels in the five leading staples, and at the Western primary markets the loss was 24,000,000 bushels. On the other hand the wheat yield in the Southwest was exceptionally large, that of Kansas alone being 82,500,000 bushels. At Chicago grain receipts for the year showed a falling off of over 30,000,000 bushels. There was a further slight loss in receipts of live hogs following the heavy decrease of the preceding year. The live stock movement as a whole, however, was somewhat heavier, being 277,205 carloads, against 269,406 carloads in 1899, and 276,043 in 1898. The cotton movement in the South was heavier than in 1899, being 6,788,664 bales, against 6,128,834. Overland shipments of cotton fell from 2,060,671 bales in 1899, and 2,022,187 bales in 1898, to only 1,737,903 bales in 1900.

Coming to individual roads, the Pennsylvania lines East and West lead all others in gains of over $14,500,000 for 11 months only. The Baltimore & Ohio in 12 months showed gains of nearly $6,500,000, the Illinois Central nearly $4,500,000, the New York Central over $3,000,000, and the Southern above $2,750,000. Among the roads reporting for 11 months only were the Atchison, with earnings of over $5,750,000, the Southern Pacific over $3,750,000 and the Chicago, Burlington & Quincy above $2,500,000. The Reading leads in roads showing decreases with nearly $1,250,000 for 11 months. The Lehigh Valley lost $542,000, and the New York, Susquehanna & Western, $295,000, all due to the coal strike. All the groups of roads show increases. The eight trunk lines gained $17,750,000, the Southern group of 11 roads $11,500,000, the Southwestern group of nine roads, $10,000,000, the Northwestern and North Pacific group (11 roads), $5,250,000, and the Middle and Middle Western (15 roads), $11,000,000.

Gross earnings for December only on 107 roads reporting show an increase over the same month of 1899 of $5,173,000, or 9.05 per cent., which is larger than for the months immediately preceding. This is due chiefly to larger cotton and grain movements. Yet the gains follow large increases in preceding years amounting to $4,000,000 in 1899, nearly $3,500,000 in 1898, and $5,750,000 in 1897. The Baltimore & Ohio leads with $426,000. Other heavy gainers were the Texas & Pacific, $364,000; the Missouri Pacific, $358,000; the Northern Pacific, $355,000, and the Illinois Central, $319,000. Only one road, the Mexican Central, reported decreases for the month above $30,000; its losses were $111.000.

In Stockholm, Sweden, the recent Christmas festivities of some of the people appear to have been unusually "strenuous," for we read that the conductors of some of the suburban night trains have been complained of for ejecting inebriated passengers at roadside stations, leaving them helpless in the snow with the thermometer 12 deg. below zero. In consequence of the agitation of the matter the State Railroad Administration has ordered that every suburban train at night must be provided with a separate car for intoxicated persons only. We note this incident merely as an illustration of paternal care on the part of state railroads; not for the purpose of reminding American conductors of a way in which they might try to ameliorate some of *their* troubles. We have in mind, however, certain conductors who, on reading this, will pray for one of two things —either that they may be relieved of the duty of running the Saturday night "theater train," or else have the Swedish rule adopted here. In this country the "coolers" provided for boisterous passengers are not kept at 12 deg. below nor are they always handy to the track.

The Russian freight regulations have been modified as to the time within which goods shipped must be delivered at destination. For ordinary freight two days are allowed for dispatching the goods, one day for every 100 miles distance, when full carloads are shipped, and one day for every 80 miles for smaller shipments, and one day for the transfer from one railroad to another. By these rules, a carload of grain shipped from Chicago to New York would be due in 12 days. Another regulation is for fast freight, for which one day is allowed for shipment, one day on the road for distances of 200 miles or less, two days for greater distances up to 400 miles, and three days for greater distances up to 665 miles, and for every 260 miles (400 versts) further, one day. For every transfer from one road to another 100 versts (66½ miles) is added to the distance, or twice as much for transfers between roads of differing gages. This would allow six days for goods from New York to Chicago.

The total railroad freight traffic in Russia in 1897 amounted to 18,914 millions of ton-miles, which is just about half the amount of the railroads in trunk line territory (between New England and Ohio) in this country. The average receipt per ton-mile was 1.04 cents—the lowest average rate of any country in Europe, doubtless. The average is brought down, as it is in this country, by the large proportion of freight hauled long distances at very low rates. The average haul is given as 154 miles; here it is 242. The average rate in Russia was 10 per cent. higher in 1897 than in 1896, and 20 per cent. higher than in 1895.

In 1897 there were reported 1,118 derailments and 519 collisions and 2,230 other accidents on the Russian railroads. By the train accidents 126 passengers were killed and 471 injured; 332 employees were killed and 1,156 injured. In considering which, remember that in this country passenger traffic is two and one-half times as great and freight traffic more than six times as great.

NEW PUBLICATIONS.

Cassier's Magazine.—The publishers of *Cassier's Magazine* have introduced a novelty in a handsome and substantial cloth binding for a certain limited edition of the Magazine. This they call the library edition, and the copies bound in this way are designed especially for libraries, reading rooms and the like, where durability is important. This library edition will be issued regularly every month.

TRADE CATALOGUES.

Motor-Driven Air Compressors.—The Westinghouse Air Brake Co. recently published a 22-page catalogue telling of motor-driven duplex air compressors of their build. It is stated in the opening paragraph that "the rapid increase in the number of electric cars, both for elevated and surface roads, and the more extensive use of electricity as a source of power generally, have created a growing demand for small electrically operated air compressors adapted to supply compressed air for car brakes and train signals as well as for various other industrial uses." This sums up the situation, and it may be said in addition that this is a field that is well worth the careful consideration shown by the contents of the catalogue. There are three views of the combined pump and motor;

an illustration and description of the automatic electrical pump governor; a diagram of wiring and piping showing method of connecting the compressor, for a car or car station, to be driven from a direct-current trolley circuit; sufficient general directions for care and operation of motor and compressor; and a table giving dimensions and other data relating to motor-driven reciprocating air pumps. The making of motors and compressors is briefly but well described.

Locomotive Sanders.—We have received from the American Locomotive Sander Co., Thirteenth and Willow streets, Philadelphia, a catalogue of locomotive sanders, patents on which are now controlled by that company. It contains good illustrations of this important subject. The "transparent" illustration of the sanders, and their various accessories and locations, is educational material that would be well placed in every roundhouse and in the hands of every locomotive engineer. The Leach sander, with its details, is shown in single, double and triple application. The "She," or improved Houston sander, is shown in single and double application, with all of its details, and many valuable suggestions are given in the matter of applying sanders. On page 26 Sherburne's attachment to engineer's brake-valve, for automatic sanding, either in emergency or service application, is illustrated.

The B. F. Sturtevant Company has issued the third edition of its catalogue No. 103, "The Sturtevant Engine." Particular attention is given to engines capable of sustaining high speed at given duty and possessing great refinement in speed regulation. It is also shown how considerable power units may be placed in restricted space, and in this connection especial attention is given to electric generating sets. Single-valve engines of the upright type and automatic cut-off, throttling engines, various enclosed types, double valve open type, double upright, compound and other engines receive consideration. The catalogue has illustrations and descriptions of various types of engine considered and some convenient tables of boiler capacities and engine horse-powers, with dimensions given.

Pneumatic Tools.—The Philadelphia Pneumatic Tool Co. has lately sent out a series of detached sheets illustrating and describing its rotary drills, powerful types and specific instances and illustrations of their use; chipping, riveting and calking hammers, with sizes, weights and capacities, and hand or suspended pneumatic rammers for foundry work, the application being also illustrated. Various conditions of work are considered in the several fields and the company proposes to design suspension for tools in special cases.

The Root & Vandervoort Engineering Co., Champaign, Ill., has issued a small pamphlet describing its horizontal and vertical gas and gasoline engines for power purposes. Stationary and portable engines are made in sizes ranging from 2½ to 8 h.p. They are designed on the Otto cycle, and are said to embody the best practice in engine construction.

New York Railroad Commissioners' Report.

The Railroad Commissioners of the State of New York have issued the 18th annual report of the Commission. The opening chapter deals with the general situation, and this is followed by a summary of the business done during the year to June 30 by the roads reporting, with statistics of accidents, etc. The Board has had 222 matters before it during the year, of which 110 had to do with grade crossings. The number of cases pending at the end of the year was 125, of which 63 were grade crossing applications presented by the Long Island road. The Board has already passed on 59 such cases for that road, but the rest must wait, as the State appropriation is exhausted; that is to say, the Long Island has had as large a share of the State's money as it is entitled to. The Commission has approved some applications of railroads for separation of grades at crossings where the town objected, and appeals of such cases are now pending in the courts.

In the general discussion of the grade crossing law, mention is made of the "belief, held by some persons," that the State ought to appropriate more money for this work, but the Board expresses no opinion on the point. A list is given of all the crossings where the Board has authorized changes, from which it appears that since the law was passed, three years ago, 48 crossings have been abolished; at 10 the work is nearing completion and plans have been made for 16 other cases. In 19 cases the Board believes that the work will be done without special urging by the State. The bound volume of the report, when it comes out, will have photographic pictures of some of the work done at crossings. The State has thus far appropriated $300,000 for separating grades, of which $25,000 has been set apart for administration expenses. The actual amount paid out for work done is $23,839; but the Board has authorized work which will cost $150,201 more. In two cases owners of abutting real estate have sued, or will sue, for additional damages. The Board refused to order the abolition of seven crossings on the Buffalo Belt Line of the New York Central, as the cost of the seven would more than exhaust the State's appropriation. In Syracuse there is a plan to abolish crossings, but this plan alone would require more than the whole of the State's appropriation for a year.

The financial statistics of street surface railroads for the year are shown in the following table (cents omitted), the Brooklyn elevated roads being included in both years, these lines being now operated by the Brooklyn Heights (surface) Railroad Company.

	To June 30, 1900.	To June 30, 1899.
Capital stock	$182,310,412	$175,124,740
Funded debt	193,274,738	153,945,310
Unfunded debt	49,029,361	39,945,345
Cost of road and equipment	370,015,239	313,880,236
Gross earnings from operation	40,811,563	37,518,466
Operating expenses	25,989,180	22,652,924
Net earnings from operation	16,822,382	14,865,541
Income from other sources	1,364,200	1,673,121
Gross income from all sources	18,186,583	16,538,662
Taxes and miscellaneous	2,356,659	1,957,095
Interest paid and accrued	7,694,553	6,806,862
Dividends	6,889,565	7,076,219
Surplus for the year	568,616	280,214

The percentage of dividends to capital stock for the year ending June 30, 1900, was 3.77; in 1899 it was 4.67.

A table is given of the traffic and earnings of the street railroads, with averages per passenger and per mile. The number of passengers reported by the street surface railroads as killed during the year is 22, of whom 15 were getting on or off cars in motion, and five were killed in collisions at grade crossings of railroads. A description is given of the "third-rail" surface electric road of the Albany & Hudson. The application of the Buffalo, Niagara Falls & Rochester for an overhead trolley street railroad 120 miles long is now pending before the Board. During the year the street surface railroads carried 153,343 tons of freight; during the preceding year 129,040 tons.

The Board does not propose any new legislation.

TECHNICAL.

Manufacturing and Business.

Harry Vissering, General Sales Agent of the U. S. Metallic Packing Company, of Philadelphia, will hereafter make his headquarters at 509 Great Northern Building, Chicago, instead of Philadelphia.

Ritchie & Ruple, of Cleveland, Ohio, announce the removal of their office from the Hickox Building to the Chamber of Commerce Building. They are prepared to make surveys, examinations and reports, and perform the inspection of structural material of all kinds.

The National Contracting Company has been incorporated in New Jersey, with a capital stock of $50,000, to build bridges. The incorporators are: Henry C. Kennedy, S. H. Stuart, 60 Broadway, New York city, and Kenneth K. McLaren, 60 Grand street, Jersey City, N. J.

Charles L. Gately, for some time Manager of the railroad department of the New York Belting & Packing Company, recently resigned that position to become Manager of the railroad department of the Manhattan Rubber Manufacturing Company, with office at 18 Vesey street, New York city.

Mr. P. H. Brangs has resigned his position with the Safety Car Heating & Lighting Company, and accepted a position as Eastern Manager of the Heine Boiler Company, of St. Louis, Mo., with office in the Bowling Green Building, 11 Broadway, New York. He was for 11 years Electrical Engineer with the D., L. & W. R. R., and for 10 years prior with the Westinghouse Company at Newark, N. J.

Wesley Meeteer, for some time Purchasing Agent of the Jackson & Sharp Company, Wilmington, Del., has resigned to become Vice-President and General Manager of the American Machinery & Export Company. This company was incorporated recently under the laws of New Jersey, with a capital of $250,000, and has opened an office at 15 Cortlandt street, New York city. The company will deal in all kinds of machinery, principally for export, and will make a specialty of buying for foreign railroads.

The Bethlehem Steel Company sends us the following: "It having been brought to our attention that a concern styling itself the Edison-Holzer Steel & Iron Process Company, has been using the name of the Bethlehem Steel Company in a letter issued by them in which they ask for subscriptions to the stock of their company, we beg to state that this company has no connection whatever with the Edison-Holzer Steel & Iron Process Company, nor do we in any way indorse the merits claimed by them for their process for treating steel."

The B. F. Sturtevant Company, of Boston, Mass., recently received the following letter from The Widdicomb Furniture Company, Grand Rapids, Mich., which speaks for itself: "The exhaust head was applied yesterday and found to be the most efficient device for the purpose the writer has ever seen. The condition of the atmosphere this morning is one of extreme moisture, which would display any spray passing out with the steam, but not a particle of moisture can be found in the air, and that even within 12 in. from the exhaust steam. As we have to purchase our water supply the device will soon pay for itself."

John W. Harrison, for 32 years a member of the Shickle, Harrison & Howard Iron Co., has disposed of his entire interest in the concern to John M. Harrison, Clarence R. Howard and George B. Leighton. He is the sole survivor of the three founders of the company, which began business in 1868 in St. Louis. Thirty-two years later the plant was moved across the river to East St. Louis. The offices have now been moved to more convenient quarters in St. Louis, and the site of the old plant is to be sold. Mr. Harrison was born in Missouri in 1840, was graduated from the Missouri State University in 1858, was Manager of a furnace at Irondale, Mo., where considerable quantities of projectiles were made for the Government during the Civil War, and went to St. Louis in 1867.

Iron and Steel.

The Federal Steel Company has sold 19,000 tons of rails to the Victorian Government Railways, Melbourne, Australia.

Ellwood Walter Kimber, Secretary and Treasurer of the Latrobe Steel Company, died Jan. 20 at his home in Philadelphia.

The American Bridge Company announces that its New York contracting office will hereafter be in charge of S. Fischer Miller, formerly with Messrs. Milliken Bros.

The Bird Iron Company of Crystal Falls, Mich., has been incorporated in Illinois with a capital stock of $50,000. The officers are: George B. Penwell, President; E. E. Crepin, Treasurer; M. S. Sanders, Secretary, and Arthur E. Buzzo, Superintendent. The directors are George B. Penwell, E. E. Crepin, R. Floyd Clinch, M. S. Sanders and John Crerer.

Automatic Block Signals on the Southern Pacific.

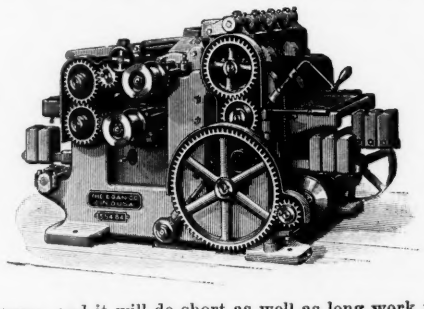
The Southern Pacific is putting up automatic signals on 30 miles of its line in the Tehachapi Mountains, Southern California. This is a single track line.

The Nicaragua Canal.

The Republican Senate caucus has decided that it would be inadvisable to take up the Nicaragua Canal bill until the British Government has acted on the Hay-Pauncefote treaty. It is believed that this will prevent action on the canal bill during this session.

A New Double-Cylinder Surfacer.

The Fay & Egan double cylinder surfacer for general planing or box factory work has the following advantages: A very solid frame; working material 24, 27 and 30 in. wide and 6 in. thick; power feed with broken rolls, either in two or four sections, and each section center-geared. The lower head comes immediately after



the upper, and it will do short as well as long work with equal facility. It is simple to operate; is powerful in all its parts, and is one of the best general double-cylinder surfacers made. The manufacturers, J. A. Fay & Egan Co., Nos. 284 to 304 West Fourth street, Cincinnati, Ohio, will furnish prices and full particulars.

Defective Air-Brakes at Nashville.

We give below another one of the monthly reports collected by Mr. Thomas, of the Nashville, Chattanooga & St. Louis, showing air-brake cars received at the Nashville yard and forwarded during the month of November. It will be observed that of something more than 9,000 cars forwarded only 29 were cut out for air-brake defects. Another table shows the cars received with air-brakes already cut out.

Number of air-brake cars forwarded	9,091
Air-brake cars O. K.	9,062
Air-brake cars cut out	29
Average serviceable air-brake cars per train	14.7
Blowing at exhaust	18
Cylinder gasket blown out	2
Brake cylinder piston broken	2
Train pipe broken	2
Branch pipe broken	1
Flat wheels	1
Brake rigging out of order	3
Total	29

Of the 29 cars cut out, 11 belonged to railroad companies and 18 to private car lines.

There were 347 air-brake cars received at Nashville with brakes cut out, for the following reasons:

Blowing at exhaust port	157
Blowing at vent port	18
Check valve case broken	2
Check valve case gasket blown out	14
Triple valves needed cleaning	11
Cylinder gasket blown out	2
Unions leaking	39
Release valves leaking	48
Angle cock broken off	5
Train pipe broken	8
Branch pipe broken	17
Brake rigging out of order	26
Total	347

Air-Brake Hose.

The Master Car Builders' Committee has issued the following circular of inquiry about specifications for air-brake hose, showing markings, etc.: The undersigned committee having been delegated to present a paper and report at the 1901 convention on the subject of "Specifications for air-brake hose, showing markings and other information," respectfully request a response to the following:

1. Do you purchase air-brake and air signal hose on specification? If so, what difference in price do the specifications make?
2. Kindly send a copy of your specifications for each, and if

there is any particular requirement on which you lay most stress, please underscore that part of the specifications.

3. If you do not have regular specifications, what, if any, special requirements do you ask, such as the number of ply, bursting pressure, etc.?

4. If you give hose a bursting test, what liquid or gas do you use in making the test?

5. Do you have a reservoir from which to draw the liquid or gas at a uniform velocity when making the test, or is the pressure obtained by pumping directly into the hose?

6. To what extent are you using all metallic connections between cars and tenders; between passenger cars or freight cars, and what is the necessity for such use?

7. If you purchase from specifications, have you found any increase or decrease in the life of the hose to that furnished without specifications?

8. Do you have any appliance to protect the coupling or nipple from injuring the inner tubing of the hose? If so, what are the results obtained?

9. Do you have hose burst in trains? If so, to what extent, and to what cause is the same most attributed?

10. What percentage of all hose removed from service is removed on account of defects due to unfair usage?

A reply to the above questions, not later than Feb. 15, 1901, to Mr. James Macbeth, D. M. C. B., of the N. Y. C. & H. R. R. R. Co., East Buffalo, is requested.

THE SCRAP HEAP.

Notes.

According to Chicago newspapers the rule of the Wabash road prohibiting the use of intoxicating liquors by employees now reads that intoxicants must not be used while on duty or "before reporting for duty." The order does not specify how long a time is contemplated in this last clause.

The Pullman Company has just finished 10 new sleeping cars to be run on trains 20 and 21 of the Pennsylvania (the Chicago and St. Louis express), and all of these cars are painted the same color as the day cars used in these trains, "Pennsylvania standard red." The interior finish of the cars is mahogany, and the upholstery, carpets and curtains are green.

The Wells-Fargo Express Company, which has circulating libraries for its employees at New York, Jersey City, Chicago, Kansas City, San Francisco and the City of Mexico, has established the nucleus of a library at its office in each of 32 other cities, the books placed at each city being the Bible and Concordance, Standard Dictionary, Century Atlas, Shakespeare and Concordance, Fallow's Synonyms, Bartlett's Familiar Quotations, and Hayden's Dictionary of Dates. Others of a similar character will be added from time to time.

Traffic Notes.

The New York Central has reduced passenger fares in Western New York to meet the local competition of suburban trolley lines, particularly around Rochester. Tickets are sold at from 15 to 40 per cent. less than the regular rates.

The Chicago and Florida special, running over the Southern Railway, leaves Chicago two days in the week by the Pennsylvania lines to Cincinnati, two days by the Big Four route and two days by the Monon and Cincinnati, Hamilton & Dayton.

Mr. John A. Smith has resigned the Commissionership of the Freight Bureau at Charleston, S. C., to become Commissioner of the Bureau of Freight and Transportation at New Orleans. The New Orleans position has been vacant for several months.

A press despatch from Pittsburgh this week reports that freight cars are so scarce that the Carnegie Steel Company fears that it will be compelled to temporarily shut down the Homestead mills. The company has lately received but a small part of the cars which it has asked for, and 3,000 tons of plates are piled up in the yards.

Commencing Feb. 1, the Erie, as well as the Lackawanna, will discontinue the use of unlimited tickets with stop-over privilege. The Erie will also introduce the use of the A. A. G. P. & T. A. safety paper for all its tickets, coupon and others, except only the engraved card tickets. The Erie has gradually exchanged all its date stamping machines for punching machines, which are similar to those used by banks in marking checks.

E. P. Bacon, representing the League of National Associations of Shippers, now in Washington, reports that with the assurances given by influential Senators prior to the holiday recess there is good reason to expect that the Cullom bill will be taken up in the Senate at an early date, and that if it is, its passage by the House at the present session is assured. In the event of failure at this session, Mr. Bacon recommends his supporters to stick to the present bill, as a basis of legislation, and thus avoid the risk that would attend the introduction of a new bill.

According to a newspaper story, Mr. George T. Nicholson, Passenger Traffic Manager of the Atchison, Topeka & Santa Fe, proposes to make interline tickets proof against manipulation by using numbers instead of the names of stations. Mr. Nicholson says that in the back pages of the Official Guide there are 50,256 names of railroad stations. He proposes to place opposite each of these an official number. Next he proposes abolishing the custom of printing the destination on the ticket, but would simply print the names of the gateways and then use the official number for the destination, punching that in with a perforating stamp with the use of safety paper, and by this system the manipulation of the tickets by brokers will be impossible.

Half January has passed and packing house rates are undisturbed. This has not been known in Kansas City before within the memory of railroading. From the very fact that the packers are distributing their favors it is accepted as proven that the tariffs are being lived up to. The Burlington is carrying for Armour, Fowler and Swift, the Wabash is getting the output of Schwarzschild & Sulzberger, the Missouri Pacific gets Cudahy's business and some from Schwarzschild & Sulzberger, the Chicago Great Western gets some Armour meats and the Milwaukee gets a great share of that consignment. The Santa Fe has been going light on packing house stuff so far, its business having gone over to the Wabash. The fact that the road let the business go without a howl demonstrates that a rate did not get it away from the big line. Northern grain shippers are looking for a rat hole somewhere. . . . —*Kansas City Journal.*

Technical Schools.

Armour Institute.—On Tuesday evening, Jan. 15, Mr. H. F. J. Porter, of the Bethlehem Steel Company, lectured before the engineering students at the Institute. The subject of the lecture was, "The Development of the Art of Forging," and about fifty stereopticon views were used for illustrations.

The Vicars-Cramp Consolidation.

It is said that the Vicars & Maxim Company have made an absolute sale of their plant and patents to the company formed by the amalgamation of the Cramp Company, the Midvale Steel Company, etc. The sale is said to be in consideration of $5,000,000 of the ordinary stock of the amalgamated company.

Chicago Harbor Improvements.

Mr. Albert H. Scherzer, President of the Scherzer Rolling Lift Bridge Co., Chicago, is preparing an illustrated book of rolling lift bridges recently built at Boston, Cleveland and Chicago. There will also be a number of studies showing how this type of bridge lends itself to ornamental design and a number of special articles will be included. Among these will be a discussion of Chicago harbor improvements. The building of the Drainage Canal and the large manufacturing and shipping interests now located on the River make any but an inner harbor at Chicago impracticable. This is held to be of the greatest importance to the city in the way of preserving the lake front, and Mr. Scherzer proposes a scheme of improvements which is more elaborate than anything so far brought out. Beside deepening and widening the Chicago River and removing the center pier bridges, Mr. Scherzer's plan includes ship canals between the Calumet River and the Drainage Canal, a canal between the North Branch and the Desplaines Rivers and a canal connecting the North Branch directly with the Lake. Then it is proposed to fill in along the lake front from the mouth of the Calumet River to Evanston, making the greatest width of the reclaimed portion about four miles. It is thought that the land thus acquired would more than pay for the cost of the filling.

Proposed Legislation.

Bills for the establishment of railroad commissions are to be introduced in the Parliament of Canada and in the Legislature of the State of Washington. That in Canada will be introduced by the Government, and it is proposed to have a commission of three persons with power to deal with all matters now under the jurisdiction of the railroad committee, as well as all questions of railroad rates. The Washington bill is the work of Senator W. W. Tolman, a Democrat. He proposes three members, to be appointed by the Governor, not more than two to belong to the same political party. The salary of each shall be $3,000 and a bond of $20,000 is to be required. The Commission is to have authority to make rates, and the railroads are subject to severe penalties for disregarding such rates. The bill also provides penalties for false billing, discrimination and other offenses.

Electric Headlights.

General Superintendent Calvert, of the Burlington & Missouri River, is reported as saying that his road will soon equip a large number of locomotives with electric headlights. He says further: "The advantages of the electric headlight are numerous, and I do not know any objection worthy of consideration. Enginemen can see switch targets and obstructions on the track far enough away to bring their train to a stop before getting into trouble. Farmers and others on crossings will be scared off by the bright light and fewer people will be run into, so that the additional expense will be offset in a short while by the saving in claims arising from accidents. On dark, foggy nights the light will show around curves [over hills] and prevent head-end collisions. Electricity is so much better for headlights than acetylene that we have stopped experimenting with the latter altogether."

Mr. Calvert cited a few examples of the efficiency of the headlights from the experience of his men with the lights now in use on the Burlington. "The very first night an engine equipped with one was on the road the agent at Grafton peered out of his bay window and saw what appeared to be a train almost to the station. He knew that no train was due at that time and was considerably exercised. He telegraphed the despatcher to ascertain what train was coming in ahead of No. 3. It turned out that the bright light which the Grafton agent saw was the electric headlight on No. 3, which was then in the Fairmont yards, seven miles away.

"At Otis a freight train pulled into a siding to get out of the way of No. 3, when No. 3 was twenty miles away. The conductor saw the headlight bearing down upon him and there was some mighty rapid hustling to get out of the way, the conductor thinking that the train was right on them. He waited twenty-six minutes for No. 3 to pass him after he got safely into clear and No. 3 all this time was coming right along."

An Illustration of Municipal Ownership.

The city of Baltimore having built, at great cost, a system of subways for the purpose of renting the same to the telegraph, telephone and electric companies to carry their wires underground, one fine day an explosion takes place, and a few blocks of the city's paved streets take an aerial flight. Then comes an investigation by a committee of engineers, which committee criticises the quality of the conduit material and the concrete, and recommends "That the subway be carefully examined wherever excavations are made which expose it, and if the concrete is found imperfect at such points it be removed by the Subway Department and replaced with good concrete; that a system of mechanical ventilation, similar to the one now in use on the Empire City subway in New York, be installed for our subway; and that such arrangements for drainage be provided that in no case can water get to the cables or into the ducts." In other words, that the conduits have been built without due regard to material used, and that no provision has been made for drainage or ventilation. Now, who is responsible? Why, nobody, of course. It is the city's own work, and no one can be held responsible. Now, supposing these conduits had been built by private enterprise, would not the owners have been held to strict accountability, and would not the city compel them to perfect the same by all the safeguards possible? Well, rather.—*Hambleton's Circular.*

Telephone Train Despatching.

The Toledo, Fremont & Norwalk electric railroad is now in operation for a length of 53 miles, and trains are run under rules substantially the same as those of the Standard Code, but with positive meeting points. The train despatcher controls the movement of trains by telephone. There are five intermediate offices and 16 other places where there is a telephone in a box, to which each conductor has a key. Printed forms are used for orders, so that only a few words have to be transmitted. Each conductor repeats every order that he receives, and, as in telegraph despatching, orders are sent simultaneously to two conductors when both can be got to the telephone at the same time.—*Train Dispatcher's Bulletin.*

Death of an Old Iron Master.

Mr. Philip James died recently in Pittsburgh. He was born in Wales in 1813, and the Pittsburgh newspapers say that he puddled the iron for the first T rails. Whether or not this is strictly true we have not undertaken to ascertain, but undoubtedly he was employed in the Dowlais Iron Works, and was also one of the early iron makers of our own country.

Railroad Material for the Argentine.

A New York newspaper some time ago said that "with the exception of some locomotives and cars which have been bought in England the United States has secured the bulk of those orders from Argentina." The *Standard* (Buenos Ayres) says that "the Great Southern is spending some £2,500,000 on extensions, improvements, etc., and thousands of tons of structural steel and of rails are under order in Great Britain, or have been received from there, but not a ton has come from the United States or is under order there. The Great Southern has ordered within the year £600,000 worth of locomotives and cars from Great Britain, including 750 steel frame cars of 30 tons capacity. The last locomotives received by the Western, the Central Argentine and the Buenos Aires & Rosario came from England, and this list comprises the roads operating half the total mileage of the Argentine. Rails have been imported from the United States in considerable quantities.

A Peculiar Railroad Danger in the Argentine.

Last December a serious country fire occurred along the line of the Great Southern Railway in the Argentine. It extended nearly 100 kilometers and burned some freight rolling stock as well as telegraph poles and fence posts. The fire appears to have been spread by the great amount of "paja voladora," or flying grass, blowing about the right of way. It seems that this stuff is a great nuisance. It is blown about by the wind and whatever care the railroad companies may take naturally they cannot keep it off their right of way so long as it exists. The *Standard* says "it is difficult for the trains to cut their way through it and it causes hot boxes and even derailments, while foremost of all is the terrible danger of its taking fire. The shifting of the wind a few points after the section hands have cleared the track of the flying grass may result in its immediately being buried in the dangerous stuff again."

Sturtevant Fans for Marine Uses.

The new twin-screw Red Star liner "Vaderland," (built by John Brown & Co., of Glasgow), is lighted throughout by electricity. The generating plant consists of four dynamos, driven by engines built by the B. F. Sturtevant Co. The system of ventilation is also by the Sturtevant Co. and is similar to the systems installed on the "St. Louis" and "St. Paul." Fans exhaust the air from every room and compartment, and fresh air is distributed throughout the passenger accommodations. Fresh air is thus constantly supplied, and in cold weather this air is heated by passing over steam pipes, and the heat supplied may be regulated for each deck independently. By this system the inner rooms of the ship are as comfortable as the outer ones. Induced draft is fitted to the boilers. The boilers are in two compartments, leading into two funnels, which are 98 ft. high from the grate level, and elliptical in plan, 13 ft. 6 in. x 8 ft. 6 in. The fans are eight in number and 7 ft. 6 in. in diam., and are driven direct by Sturtevant direct-acting engines. The air is heated by passing through tubes placed in the way of waste gases from the furnaces. The inlet of air to the furnaces is through tubes placed in a casing over the boiler, thence down a passage in front of the smoke-box at the end of the boilers and into the furnaces. The gases from the furnaces, after passing through the boiler, play around the tubes forming the air inlet and subsequently pass through the fans into the funnels.

Hoosac Tunnel.

In order to more thoroughly ventilate Hoosac Tunnel, arrangements have been made for running the fan at the central shaft 19 hours a day, instead of five hours as formerly, and it is expected this new arrangement will accomplish a much needed improvement.

About three and one-half miles of 85-lb. rails in 45-ft. lengths has been laid in the tunnel.—*Boston & Maine Messenger.*

The Bagdad Railroad.

Rumors are spreading over Germany to the effect that the German syndicate which secured the concession for the construction of the Bagdad Railroad has lost the good will of the Turkish government, and that another syndicate, which does not insist upon a guarantee per kilometer, is going to replace the Germans. The *Novoie Vremya*, commenting on the matter, does not believe in these statements, and calls attention to the fact that the German government only recently appropriated an annual sum of 150,000 marks for establishing commercial agencies in connection with all the German consulates in the Ottoman Empire. The Russian paper further states that an English offer, without guarantee, had previously been submitted, but was refused by the Sultan in favor of the Germans.

New Bavarian Railroad Loan.

Official organs in Bavaria announce the early emission of a new railroad loan (4 per cent.) to the nominal amount of $25,000,000. The money will chiefly be used for improvement of the roadbed, purchase of additional rolling stock, erection of new station buildings, etc.

A Professorship at Annapolis.

The Secretary of the Navy has appointed a board to examine candidates for appointment to the vacancy in the grade of Professor of Mathematics in the Naval Academy created by the death of Prof. Marshal Oliver. Prof. W. W. Hendrickson, U. S. N., of the Naval Academy, is President of the Board, and several candidates have already been designated to appear before it.

Electric Plant for Amsterdam.

U. S. Consul Frank D. Hill reports to the State Department from Amsterdam that the City Council of that city has voted over $2,000,000 for an electric plant to supply power for street cars, lighting, etc., for the city.

Bridges for the Uganda Railway.

It is a matter for general regret that the contract to erect 34 bridges on the Uganda Railway has been captured, in open competition with British bridge builders, by the American Bridge Company. The amount of the contract is £135,000, and the weight of the steel required about 7,000 tons. It is stated that these bridges are to be made to the drawings, specifications and tests of Sir Alex. Rendle, and the only suggestion in ex-

planation that we can offer is that British manufacturers have had a much larger experience of such tests and specifications than Americans have had, and that therefore they quoted accordingly.

The consulting engineer does not flourish in the States like (Sic.) he does in this country, but now that this order has gone to America it is the duty of manufacturers here to see that the American Bridge Company is treated exactly as they have been in the past.—*Railway Engineer (London.)*

Appropriations for Naval Work.

The naval appropriation bill which was reported to the House on Jan. 19 carries a total appropriation of $77,016,635, the largest amount ever recommended for the Navy. It is nearly $12,000,000 more than the bill of last year, and is still over $10,000,000 below the estimates of the Navy Department. For the increase of the Navy the bill recommends two unsheathed battleships and two unsheathed armored cruisers, carrying the heaviest armor and ordnance of their respective classes upon a trial displacement of about 14,000 tons, with the highest practicable speed and greatest radius of action. The battleships are to cost, exclusive of armor and armament, not more than $3,850,000 each, and the armored cruisers not exceeding $4,000,000 each, the maximum cost of the four vessels to be $15,700,000.

The following amounts are appropriated for naval work at the stations named: Portsmouth, $378,850; Boston, $526,000; New York, $1,000,000; League Island, $695,230; Norfolk, $594,260; Key West, $144,000; Mare Island, $331,660; Puget Sound, $273,000; San Juan, $40,000; Dry Tortugas, $100,000; Pensacola, $41,500; Algiers, $230,000; Hawaii, $107,300; Tutuila, $225,000. For Washington, $318,210 is provided, which includes $50,000 for new gun plant machinery; $100,000 for new workshop machinery; and for construction and repairs of various shops about $150,000, including increase of electric light plant. For the four new dry docks at Portsmouth, League Island, Boston and Mare Island, $1,000,000 is provided and $3,000,000 is allowed toward the rebuilding of the Naval Academy already begun. For armor and armament of ships now building, $4,000,000 is recommended.

Report of the Joint Postal Commission.

The Postal Commission of the House and Senate, which has been investigating postal matters for the last two years, has made its report. The Commission unanimously reports in favor of excluding from the second-class mail rate, first, books, whether bound or unbound; second, newspapers and periodicals unsold sent by a news agent to another news agent or returned to the publisher; third, sample copies of newspapers above a certain small fixed proportion of the circulation.

The Commission also unanimously reports against the continuance of transmitting mails in pneumatic tubes under present conditions. [Too high cost.] The Commission unanimously reports that neither a change in letter postage nor the establishment of a system of parcels post is practicable under existing conditions of revenue and expenditure, even if otherwise desirable, upon which no opinion is expressed.

Upon the question of railroad mail pay there are five reports.

First.—A report signed by Senators Wolcott and Allison, which declares that the present rate is not excessive, and ought not to be changed except by the discontinuance of the appropriations for special facilities, which, it declares, should be discontinued.

Second.—A report signed by Mr. Loud, concurring with the last named report, except that it recommends the adoption of railroad mail payments in accordance with space occupied instead of by the methods now prescribed by law.

Third.—A report signed by Mr. Moody, which declares that upon the evidence the pay is not excessive, but recommends further investigation as to the prevailing methods of loading postal cars and inquiry into the question whether the methods may not be corrected so as to result in a saving without injury to the carrier. In this report Mr. Catchings concurs.

Fourth.—A report signed by Senator Martin and Mr. Catchings, dissenting from the views of the other members of the Commission with regard to the discontinuance of appropriations for special facilities.

Fifth.—A report signed by Mr. Fleming, in which he states that he thinks there should be some reduction in the present rate either by a 5 per cent. reduction generally, and a still further reduction on the routes where the volume of traffic is greatest, or, in case these suggestions are not adopted, by a change in the special payment for postal cars. Mr. Fleming also holds that the Government should pay for the transportation of post office officials when traveling as passengers in passenger cars. Free transportation for mail men should, he holds, be confined to mail cars.

Senator Chandler does not join in any report, owing to his absence from Washington.

A Car Ferry Accident.

On the morning of Jan. 21, about 3 o'clock, a sleeping car on the transfer steamer "Maryland," making its regular trip from Harlem River Station to Jersey City, New York Harbor, broke away from its fastening and ran back to the edge of the deck. The car was one of two standing on the track in the starboard gangway of the boat, and was fastened in front by the usual chains, but for some unexplained reason the chains parted, and the car ran back with such force as to break over the chock or bumping block. The hind truck of the car went overboard and was lost, and the body of the car, dropping to the deck, rested, when it stopped, with about 12 ft. of its length hanging over the water. The car contained about 20 passengers, but, if we may believe some of the reports, they were not even awakened by the fall of the car body to the floor.

The Paris Metropolitan.

On the Paris Metropolitan Railroad the motormen are called "wattmen"—in pure English. The management never confesses that the operation of the road was begun with men, especially "wattmen," very imperfectly trained. The latter should be drilled two or three months before taking charge of a train; but they were set to work after about a week's training, to meet the demand for transportation to the Exposition. Nearly everything else was imperfect, but nevertheless the road carried one day as many as 170,000 passengers, and in October an average of 117,000. But the management declares that much remains to be done. It has ordered as an experiment five motor cars 32 ft. long, on trucks, of 400 h.p.—double the power of the present motors, and is testing a new electric locomotive intended to haul five or six cars, with which it is purposed to despatch trains at intervals of only three minutes. To prevent crowding at the ticket windows, it is proposed to sell packages of 10 tickets at a reduced price. "As it frequently happens that trains have to halt in a block section between stations," it is suggested that it might be well to establish intermediate stations with a wooden platform, where, should the delay be long, passengers who are in a hurry may get out and reach the street!

Crossing Damages in Chicago.

In a suit involving the question of damages to property owners, where grades have been separated, at street crossings in Chicago, the Supreme Court of Illinois has handed down a decision which is said to confirm the view of the city officials that these property owners will not be able to recover much from the city in the way of damages. The suit had to do with a crossing on the Illinois Central. It appears that in the agreement between the city and the railroad, the city bound itself to settle the claims of owners of property abutting on the street near the railroad; but, as the grade of the street was lowered but little, it was believed that the damage would not be large in any case. The present suit was brought by a man who claims that since the railroad has been elevated the nuisances of noise, dust, cinders, smoke, etc., have been worse than before. The Court holds, in substance, that even if it be true that the nuisance is increased, the land owner has no remedy, as the railroad company is simply occupying its original right of way for the legitimate purposes for which the right of way was granted.

"The increased uses of the right of way of appellee which have produced the effects complained of are a necessary incident to and inseparable from the successful operation of appellee's railroad and fall within the terms of the grant of its right of way. There is a lasting concession which is not exhausted with the building of a surface road, but which entitles the company to a change of construction and operation to meet the demands upon it of a growing business and the changes wrought by the development of society."

Furthermore, in answer to another contention of the appellant, it is said that the right of way is not a public highway, like a street, and that there is, therefore, no force in the argument that the abutting property owner has an easement in the light, air and view which would naturally come over such right of way to his premises. The company holds its ground as private property, and is responsible to the public only in its capacity as common carrier.

Steamers For the Eastern Chinese Railroad.

A report from St. Petersburg is to the effect that the administration of the Eastern Chinese Railroad Company recently placed orders for six steamers, of which two ("Argun" and "Amoor") are to be built by the Neptun Yards of Rostock, Germany; two ("Shilka" and "Nonni") by the Vulcan Company of Stettin, Germany, and two ("Mongolia" and "Manchooria") by the Stabilimento Tecnico, of Trieste, Austria. All these steamers are to be provided with twin screws, to have first-class accommodations for passengers, to be lighted throughout by electricity, and, as a new feature, are to have a hospital room, an apothecary and a steam bakery. Every steamer will have two three-phase expansion machines of 900 h.p. each. They are also to have accommodations for the mail service.

New Narrow Gage Railroad in Poland.

The Russian *State Gazette* publishes a decree according to which the company known as "Gesselschaft der Lodzer Fabrikbahn," of Warsaw, has been granted a concession for the construction of a narrow-gage railroad, 32 versts (about 21 miles) in length, from Lodz (the "Polish Manchester") to Koljushki. This line must be completed no later than March 31, 1903. Five million rubles will be spent for its construction.

A New Mountain Railroad in Switzerland.

At a meeting recently held at Bern it was definitely decided upon the construction of a railroad to the top of the Säntis. The line will be built in three distinct sections, the first of which to be worked by steam and the two latter by electricity. The highest point will be at an elevation of 8,562 ft., or about 1,700 ft. higher than the terminal of the Pilatus Railroad. The necessary capital for the construction of the road has already been subscribed.

Apples, Passes and Umbrellas.

The distribution of 30 $5 umbrellas by the Pittsburgh agent of the Burlington among ticket agents in that city, shortly before Christmas, has raised a storm among the various lines. It caused the agent of the St. Louis & San Francisco to distribute apples, and the Colorado Midland to send around annual passes for ticket agents and their wives. It is asserted by railroad men here that these gifts were a violation of the anti-commission agreement of last year. The matter will be taken up at the next meeting of the Western Passenger Agents' Association.—*Chicago Press Despatch.*

LOCOMOTIVE BUILDING.

The Arizona & New Mexico is having three engines built by the Baldwin Locomotive Works.

The Shreveport & Red River Valley has ordered three engines from the Baldwin Locomotive Works.

The Philadelphia & Reading has ordered 50 Class I-C (compound) locomotives from the Baldwin Locomotive Works.

The Atchison, Topeka & Santa Fe is considering increasing its present order with one of the locomotive works.

The Pennsylvania has ordered 48 of its standard Class F-3 (mogul) engines from the Baldwin Locomotive Works.

The Missouri Pacific order with the Schenectady Locomotive Works, referred to Dec. 7, has been increased from 50 to 75.

The Baltimore & Ohio has ordered 20 compound consolidation engines, with Wootten boilers, from the Baldwin Locomotive Works. They will be similar to those of the 1800 class recently built for the road by the same works.

The Michigan Central has ordered six passenger and four consolidation engines from the Schenectady Locomotive Works. They will have wide fire-boxes and are for April and May delivery. The passenger engines will be of the Northwestern type, weighing 167,000 lbs. with 95,000 lbs. on the driving wheels, and have 21-in. x 26-in. cylinders; 79-in. driving wheels, straight top boilers, with a working steam pressure of 200 lbs. and 400 tubes 2 in. in diam. and 16 ft. long; fire-boxes, 96 in. long and 75⅝ in. wide; and a tender capacity for 5,100 gals. of water and eight tons of coal. The consolidation engines will weigh 183,000 lbs., with 160,000 lbs. on the driving wheels and have 23-in. x 32-in. cylinders; 64-in. driving wheels, straight top boilers, with a working steam pressure of 210 lbs. and with 369 tubes 2 in. in diam., and 16 ft. long; fire-boxes, 96 in. long and 75⅝ in. wide; and a tender capacity for 5,100 gals. of water and eight tons of coal. The specifications for both types call for Westinghouse brakes, Sargent brake-shoes, Gould couplers, Hancock inspirators, U. S. Metallic piston and valve rod packings, Consolidated safety valves, Leach sanding devices, Michigan lubricators and Detroit springs. The passenger engines will have the Consolidated system of steam heat.

CAR BUILDING.

The Chicago Great Western is in the market for about 70 gondola cars.

The Rutland is reported to have ordered 1,000 box cars from the Pullman Co.

The Chicago, Rock Island & Pacific has ordered 10 coaches from the Pullman Co.

The Burlington, Cedar Rapids & Northern is reported in the market for freight cars.

The Vandalia Line has ordered 125 gondola cars from the American Car & Foundry Co.

The Buffalo, Rochester & Pittsburgh has ordered 10 coaches from the Jackson & Sharp Co.

The National Biscuit Co., it is stated, may be in the market for a small number of box cars.

The Merchants' Despatch Transportation Co. will build 100 cars of various kinds at its own shops.

The Michigan Central has ordered 100 flat and 200 box cars from the American Car & Foundry Co.

The Missouri Pacific has ordered 15 coaches and 10 chair cars from the American Car & Foundry Co.

The St. Louis, Bellville & Southern has ordered 200 coal cars from the American Car & Foundry Co.

The Wabash, it is reported, will be in the market in the near future for a large number of freight cars.

The Chicago, Rock Island & Pacific has ordered 500 box cars from the Pullman Co. Simplex bolsters will be used.

The Missouri, Kansas & Texas has not ordered 30 coaches, as has been reported, but is now in the market for a small number.

The Chicago, Burlington & Quincy has ordered 100 freight cars from the American Car & Foundry Co. They will be built at Chicago.

The Erie order with the Pressed Steel Car Co. for 1,000 wooden box cars with metal underframes, referred to Nov. 9, has been increased to 1,500.

The Los Angeles Terminal has ordered 10 passenger and 100 freight cars from the American Car & Foundry Co. They will be built at the St. Charles Works.

The Missouri Pacific has ordered 46 box, 16 stock and 11 furniture cars from the American Car & Foundry Co. These are in addition to the 2,500 referred to Dec. 28.

The Mobile & Ohio, it is reported, will soon be in the market for freight cars. Similar reports in reference to this road have been circulated for the past several months.

The American Car & Foundry Co. has orders for 300 coal cars of 80,000 lbs. capacity for an individual coal company; 170 box and gondola cars for export and for 275 four-wheel coal cars.

The Mexican International has ordered 20 steel gondola cars from the Sterlingworth Railway Supply Co., Easton, Pa. They will be of 80,000 lbs. capacity and similar to the cars built by the same company for the Delaware, Lackawanna & Western and the New York, Ontario & Western, except that the Mexican International cars will have no hoppers. The order of the road with the Mt. Vernon Car Mfg. Co. calls for 100 side-hinged gondola cars of 60,000 lbs. capacity. The specifications include Canda draft rigging and French springs.

BRIDGE BUILDING.

Allegan, Mich.—The Pere Marquette R. R. will bridge the Kalamazoo River.

The Grand Rapids, Allegan & Kalamazoo Traction Co. will build two bridges in Allegan and two in Otsego township, both to cross the Kalamazoo River.

Allegheny, Pa.—The City Council is reported to have authorized a bond issue for a bridge over Shady avenue.

Altoona, Pa.—A wagon bridge is proposed at Eleventh street.

Andover, N. B.—It is said that bids will be wanted early in the spring for the steel bridge to be built over the St. John River between Andover and Perth. We recently reported that plans were being made for a structure 1,200 ft. long. A. R. Wetmore, Province Engineer, Fredericton, N. B.

Bastrop, La.—We are told that the New Orleans & Northwestern Ry. proposes to build a drawbridge over Bayou Bartholomew north of this place shortly. It will be 150 ft. long and of steel.

Beaver Falls, Pa.—The Clarion & Summerville R. R. will let contracts in about 30 days for a steel bridge of 250 ft. span. J. C. Whitla is President.

Boston, Mass.—City Engineer Wm. Jackson has made preliminary plans for widening the Congress street bridge over Fort Point channel. The plans provide for a center pier drawbridge, 500 ft. long and 100 ft. wide, similar in design to the Summer street bridge. A temporary bridge is proposed between the Summer and Congress street bridges, while the new structure is being built.

Bridgeport, Conn.—Plans have been adopted for the Yellow Mill drawbridge which is estimated to cost about $141,000. A bond issue of $75,000 will have to be made. (Nov. 16, 1900, p. 762.)

Buffalo, N. Y.—Supervisor Wm. Conboy, of Grand Island, has filed a petition with the Board of Supervisors

providing that the county or two of the towns build the bridge projected between Buffalo and Grand Island. The charter of the Grand Island Bridge Co. expires soon.

BURLINGTON, IOWA.—The Citizens' Bridge Company, with $100,000 capital, was incorporated Jan. 17. The officers are W. W. Parsons, President; C. M. Hyskell, Secretary; George Boesch, Treasurer. The object is to build a wagon bridge at Burlington.

A new bridge is proposed over the ravine on West avenue between Summer street and Garfield avenue. City Engineer Steece has made plans and specifications.

CAIRO, ILL.—The Big Four will soon want bids on a single track steel viaduct 430 ft. long on the Cairo Division. Estimated cost, $18,000.

CHARLEROI, PA.—The House Committee on Interstate and Foreign Commerce has referred to the War Department a bill authorizing the Charleroi & Monessen Bridge Co. to build a bridge over the Monongahela River. This project was reported in our last Construction Supplement, p. 35.

CHARLESTON, W. VA.—The Mayor has appointed a committee to confer with the County Court regarding the proposed bridge across Elk River at Virginia street. It is stated a new bridge can be built for $25,000.

CHICAGO, ILL.—The following bids were received, Jan. 16, by the Drainage Board for four bascule bridges over the Chicago River. For the substructures the lowest bids were: The Canal street bridge, Lydon & Drews Co., Chamber of Commerce Building, $53,914; Harrison street bridge, Lydon & Drews, $54,407; Main street bridge, John P. Agnew, 1401, 100 Washington street, $50,108; and Ashland avenue bridge, Page & Shnable, for $35,542. For the superstructures, the lowest five bids for each bridge were: Canal street bridge, American Bridge Co., $72,800; C. L. Strobel, $76,400; Illinois Bridge Co., $77,000; Hansel-Elcock Foundry Co., $77,500, and the Toledo Bridge Co., $79,500; Ashland avenue bridge, Massillon Bridge Co., $91,200; American Bridge Co., $94,000; Toledo Bridge Co., $95,000; C. L. Strobel, $102,200, and the Indiana Bridge Co., $107,900; Harrison street bridge, American Bridge Co., $86,800; C. L. Strobel, $97,980; Milwaukee Bridge & Iron Co., $98,900; King Bridge Co., $99,000, and the Toledo Bridge Co., $104,000; Main street bridge, American Bridge Co., $72,800; C. L. Strobel, $91,200; Milwaukee Bridge & Iron Co., $93,700; King Bridge Co., $94,000, and the Toledo Bridge Co., $98,000.

Business men of "Goose Island" (North Side) are considering plans to have new bridges built over the North Branch of the Chicago River, to replace the two bridges on Division street. The one over the canal is closed.

The Chicago office of the American Bridge Co. has a contract for between 10,000 and 11,000 tons of steel for the Joint Track Elevation Company, which includes the Chicago & Alton, the Illinois Central and the Atchison, Topeka & Santa Fe railroads. This steel is for the bridges for track elevation proposed in Chicago. The work will be made in Chicago and will be delivered between Oct. 1, 1901, and March 1, 1902. The exact number of bridges to be built is not known, as some of the streets over which bridges are projected may be closed, and others which are planned to be closed may be opened.

COLUMBUS, OHIO.—Bids are wanted, Feb. 12, for some bridge work. Address Chas. E. Perkins, Chief Engineer, Public Works.

County Engineer Maetzel is reported to have plans for the Hibernia bridge over the Big Walnut Creek on the National road. It is to be a three-span plate girder structure, with a 21-ft. roadway. Estimated cost, $60,000.

CONOWINGO, MD.—The Conowingo Bridge Co. is considering the advisability of building a new steel span of 150 ft. on the Cecil County side to its bridge over the Susquehanna River.

DULUTH, MINN.—It is stated that bids will soon be wanted for the suspended bridge to be built over the ship canal connecting Lake avenue and Park Point.

EDGELEY, PA.—We are informed that the county officers want estimates on a bridge over Nevil Branch at this place. John Smith, Assessor, Rushland, Pa.

FARGO, N. D.—The House, on Jan. 19, passed a bill authorizing the Fargo, Duluth & Northwestern R. R. to build a bridge across the Red River of the North at Fargo. The bill had the approval of the War Department, and was favorably reported by the Committee.

FORT WAYNE, IND.—The Clinton street bridge is reported unsafe. The County Commissioners are asked to either build a new structure or strengthen the present one.

GARDINER, ME.—Bids for a steel draw span about 166 ft. long for the Kennebec bridge are wanted Jan. 25. Chas. O. Wadsworth, City Clerk.

GRAY'S POINT, MO.—The House of Representatives has passed the bill authorizing a bridge across the Mississippi River at or near Gray's Point, Mo., with a main channel span of 1,000 ft.

GRENADA, MISS.—The House of Representatives has passed a bill authorizing a bridge built across the Yalabusha River in Grenada County.

HOUGHTON, MICH.—The Supervisors of Houghton County are reported to have decided to build the center pier bridge on Portage Lake.

The House of Representatives has passed a bill authorizing Houghton County to bridge Sturgeon River.

HULL, QUE.—The municipality of East Hull will build a bridge across the Gatineau River near Farmers Rapids.

LOWELL, MASS.—The Lawrence street bridge is reported in bad condition by City Engineer Bowers. He suggests a new bridge.

MONCTON, N. B.—The Chief Commissioners, Department of Public Works, ask tenders for the following bridges: McGregor, Finger Board and Cottage bridges, each in the Parish of Dalhousie, Restigouche County; Dunbar bridge, on road leading to Tay Creek, Hamptown, York County; Gealy bridge, Parish of Petersville, Queens County; Coal Branch Stream bridge, near coal mines, Weldford, Kent County; South branch Oromocto bridge, Parish of Blissville, Sunbury County. Tenders will be received until Jan. 28.

MONTREAL, QUE.—The city of Montreal has agreed to pay one-fourth of the cost of raising the Grand Trunk tracks from Bonaventura Station to St. Henri. The work includes a number of subways, the total cost of which will be $2,155,000.

NESHANIC, N. J.—The Lehigh Valley has let a contract to the American Bridge Co. for a steel bridge 330 ft. long over the Raritan River at this place.

NEW HAVEN, CONN.—The Committee on Railroads and Bridges is considering the petition for a new bridge at the site of the Barnesville bridge on Grand avenue; also for a new drawbridge on Kimberly avenue, over West River, ordered by the Secretary of War.

NEW WESTMINSTER, B. C.—The Government will be asked to build a bridge across the Fraser River at this place.

NEW YORK, N. Y.—We are told that John L. Shea, Commissioner of Bridges, will receive bids some time in March for a steel drawbridge over Mott Haven Canal at 135th street, estimated to cost $30,000.

The Commissioner of Bridges will also receive bids in March for a steel bridge 172 ft. long over the Bronx River on Westchester avenue, at a cost of about $100,000.

An ordinance authorizing work on the new bridge over Gowanus Canal at Hamilton avenue, Brooklyn, has been referred to the Committee on Bridges and Tunnels.

The Board of Estimate and Apportionment has authorized the Corporation Counsel to condemn land required for the Brooklyn anchorages for the third bridge over the East River between the boroughs of Manhattan and Brooklyn.

NORFOLK, VA.—A hearing was given by the House of Representatives last week on the bill authorizing the Norfolk & Berkley Bridge Co. to build a bridge over the East Branch on the Elizabeth River.

NORTHFIELD, MASS.—The Central Vermont has petitioned the Legislature for permission to build a railroad and highway bridge over the Connecticut River.

OLEAN, N. Y.—Bids are wanted by the J. R. Droney Lumber Co. for a five-span plate girder bridge.

PHILADELPHIA, PA.—The Joint Special Committee of Councils, appointed to make plans for abolishing the grade crossings on the Philadelphia & Reading along Ninth street, from the terminal to Broad street, and along the Richmond Hill Branch, has made its report. The railroad agrees to build a bridge across Diamond street, with a through girder bridge across Tenth street. A deck bridge is to span the intersection at Eleventh and Nevada streets. Bridges are also to be built on Kensington and Frankford avenues, and Tulip, Thomson and Belgrade streets, and Aramingo avenue. The total work is to cost about $8,342,000.

PITTSBURGH, PA.—A large bridge will be wanted on the electric railroad projected from the terminus of the Perrysville avenue branch of the United Traction Co. J. D. Thomson and James Swan, of Allegheny, are reported interested.

The plans for an iron highway bridge to span South Twenty-first and Twenty-second streets, and connect Pius and Mission streets, have been finished by the Department of Public Works. The plans provide for two structures, one to be 250 ft. long and the other 400 ft. long. Each bridge will have an 18-ft. driveway and a 5-ft. sidewalk. Estimated cost, $25,000.

PUEBLO, COLO.—City Engineer Wm. Peach is reported to have made estimates for the proposed viaduct at South Main street over the Denver & Rio Grande.

READING, PA.—The Mayor, in his annual message, suggests building a bridge at Spring street, between Sixth and Eighth streets.

RIVERSIDE, CAL.—Plans will be made by the City Engineer for the proposed viaduct across the Santa Fe tracks, connecting Park and Pachappa avenues.

ROWLESBURG, W. VA.—The County Court of Preston County has appropriated $17,000 for an iron highway bridge over Cheat River.

ST. LOUIS, MO.—A hearing was given by the House Committee on Interstate and Foreign Commerce last week in Washington, D. C., on the project for a third bridge over the Mississippi River between St. Louis and East St. Louis. The Government engineers made a report in August, 1899, for a bridge from Mullanphy street, St. Louis, the west span of which should have a clear width of 700 ft. The promoters for the new bridge propose to locate it between the two existing bridges and want a structure with a main span of 500 ft. A. J. Tullock, of Kansas City, Mo., is the Engineer.

ST. MAURICE, ONT.—The Railway Committee of the Privy Council has approved of the plans of the sites for the proposed bridge of the South Shore Ry. over the St. Maurice River at St. Maurice.

SALT LAKE CITY, UTAH.—E. J. Yard, Chief Engineer of the Rio Grande Western, will receive bids, until Feb. 11, for masonry work for 84 abutments.

SEVIERVILLE, TENN.—The County Court has appointed a commission to get estimates for a bridge over the west fork of Pigeon River, two miles above this place. The bridge is to have 150-ft. span and bids will be wanted at the meeting to be held on April 1. John Chandler, County Clerk. John Rambo, M. P. Thomas and W. B. Emert are the Engineers.

TEMECULA, CAL.—We are told that bids are wanted by the Board of Supervisors in February for a 220-ft. bridge over Temecula Creek. Geo. M. Pearson, County Surveyor, Riverside.

TONAWANDA, N. Y.—A bill has been introduced in the Legislature, appropriating $20,000 for a bridge over the Erie Canal at North and Niagara streets.

TOPEKA, KAN.—Two bridges are proposed over the Kansas River in North Topeka. One on Fairchild street, will be about 1,000 ft. long and cost about $15,000, to be paid for partly by the city and the county and by private subscription.

TORONTO, ONT.—The City Engineer will make plans for a bridge over the railroad tracks at the foot of Yonge street. Probable cost, $55,000.

TRAVERSE CITY, MICH.—The Grand Rapids & Indiana Ry. is reported to have asked the Board of Supervisors for permission to build its proposed bridge over the Boardman River near Cass street, Traverse City.

TRENTON, N. J.—On Jan. 15 the Senate passed the bill authorizing the United New Jersey Railroad & Canal Co. and the Philadelphia & Trenton R. R. Co. (now the Pennsylvania R. R.) to build and maintain a bridge across the Delaware River near Trenton. The act is to be null and void unless the bridge is commenced within one year and completed in three years. Any change in plan or in the bridge after completion is subject to the approval of the Secretary of War, who may also direct changes at the cost of the owners at any time in order to preserve free and convenient navigation of the river. All railroad companies desiring to use the bridge are to have equal use of it on paying a reasonable compensation for its use, and in case of failure to agree on terms the Secretary of War, after a hearing, shall decide the matters at issue. Telegraph and telephone companies are also given the right to use the bridge.

WASHINGTON, D. C.—The District Commissioners gave a hearing last week to the South Capital Bridge Association regarding the proposed bridge across the East Branch of the Potomac River, on the line of First street, S. W.

WILMINGTON, DEL.—The City Engineering Department is reported to have plans for the proposed bridge over the Baltimore & Ohio R. R. at Sixth street, on which work will soon be begun.

WINNIPEG, MAN.—We are told that D. B. Hanna, General Superintendent, Canadian Northern, will receive bids, until March 1, for a steel bridge 750 ft. long over Red River, estimated to cost $170,000.

YOUNGSTOWN, OHIO.—Two overhead bridges are proposed over Crabb Creek and the Erie and Lake Shore & Michigan Southern tracks. One at McGuffey street will cost about $75,000. The other is on Belmont avenue.

Other Structures.

INDIANAPOLIS, IND.—Last week the Committee of Architects appointed by the Secretary of the Treasury to examine the plans submitted by ten architects for the new post office and custom house building at Indianapolis, Ind., reported unanimously in favor of the plans of Rankin & Kellog, of Philadelphia. The decision has been approved by the Secretary of the Treasury.

OMAHA, NEB.—The Union Pacific, according to report, is having plans made for new car and machine shops in Omaha.

PORT ARTHUR, ONT.—The Canadian Northern will build a 1,500,000 bushel elevator at a cost of about $350,000. J. A. Jamieson is making the plans.

PROGRESSO, MEXICO.—The Schultz Bridge & Iron Co. has the contract for a pier and warehouse at Progresso, Yucatan, Mex., for the Compania del ferror carrill Muelle y Almacenes del Commercio. The pier is for a double track railroad, and will be 40 ft. wide and 550 ft. long; 8-in. solid steel piles will be used.

READING, PA.—The Reading has let a contract to Ryan & Kelly, of this city, for a brick boiler house in Reading. It will be one-story high, and is one of the various subsidiary buildings to be erected in connection with the big locomotive repair shops now building.

ST. JOSEPH, MO.—The general office of the St. Joseph & Grand Island Ry. will be moved to a new building in the spring.

SCRANTON, PA.—The Babylon Breaker of the Temple Iron Co. at Duryea, was destroyed by fire Jan. 22. The breaker was a new and modern one, and was valued at $100,000.

SEATTLE, WASH.—Press despatches from Seattle, Wash., say that Commander W. T. Burwell, U. S. N., of the Puget Sound Naval Station, has received authority to ask for bids and let contracts for improvements at that station to cost about $100,000. Two brick storehouses for ordnance supplies, a new wharf at Bremerton, a system of yard railroads with a steam locomotive and a crane are mentioned as among the improvements.

TERRE HAUTE, IND.—The Southern Indiana contemplates building a new freight house between Poplar and Ohio streets.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

Canadian Society of Civil Engineers.

An ordinary meeting was held Jan. 17. An abstract on "The Ozonization of Water" was presented and discussed.

General Baggage Agents.

The American Association of General Baggage Agents held its twenty-first annual meeting at St. Augustine, Fla., Jan. 17. Discussions were had on the substitution of card checks in place of brass; on through excess baggage rates; and on arrangements for the business of the Pan-American Exposition at Buffalo.

The following officers were elected: President, B. Peddicord, Baltimore & Ohio; Vice-President, J. A. Osborne, Illinois Central; Secretary, J. E. Quick, Grand Trunk, Toronto. Portland, Ore., was selected as the place for the annual meeting in June, 1902.

North-West Railway Club.

At the January meeting of the club, held at the Hotel Ryan, St. Paul, Jan. 16, the resignation of President E. A. Williams, who is about to make a change in location, was accepted. Mr. T. A. Foque, former Secretary, was elected President of the club, and Mr. T. W. Flannagan, Chief Clerk, Mechanical Department, "Soo Line," Minneapolis, Minn., was elected to succeed Mr. Foque as Secretary.

Two papers were read, "Electric Traction for Heavy Railroad Service," by Mr. Edward P. Burch, Electric Railroad Engineer, and "A Brief History of Composite Car Wheels," by Mr. George H. Bryant, of Chicago.

The Engineers' Club.

At the recent annual meeting of the Engineers' Club (New York) the following officers and trustees were elected: *President*, John C. Kafer; *Vice-Presidents*, A. G. Mills and H. S. Haines; *Treasurer*, Geo. E. Weed; *Secretary*, Chas. W. Baker; *Trustees*, O. F. Nichols, James Cruickshank, John C. Kafer, Geo. A. Just, Wm. H. McCord, E. D. Arnold, P. T. Dodge. The following is the official ticket: For *President*, E. E. Olcott, New York City; for *Vice-Presidents*, C. F. DeLandero, Pachuca, Mexico; J. E. Hardman, Montreal, Canada; J. H. Hammond, Denver, Colo.; for *Managers*, G. A. Crocker, New York City; H. V. Winchell, Butte, Mont.; Clemens C. Jones, Richmond, Va.; for *Treasurer*, Theodore D. Rand, Philadelphia, Pa.; for *Secretary*, Rossiter W. Raymond, New York City.

The Car Foremen's Association of Chicago.

The regular meeting of the Car Foremen's Association of Chicago was held in Room 209, Masonic Temple, Wednesday evening, Jan. 9, about 60 members being present. Twenty-four new members were added. The discussion of the committee's report on labor for applying draft timbers to refrigerator cars was deferred until the next meeting, as it appeared that the members had

not had sufficient time to digest the report in order to discuss it intelligently. In discussing Mr. Harvey's paper on the most successful method of repairing and handling air-brakes, Mr. Kidder, of the Westinghouse Air Brake Co., made an interesting talk, indorsing Mr. Harvey's recommendations. Other remarks followed along the same line. It was the general opinion that a material charge for the fulcrum and guides was proper, unless the entire brake-beam and connections were all missing. In regard to the labor charge for applying one new draft timber and four draft timber bolts to the companion timber, the unanimous opinion was that a charge of nine hours was proper; six hours for the new draft timber and three hours for the four draft timber bolts. The next meeting will be held Feb. 13.

New York Railroad Club.

Mr. Thomas Tait's paper, "A New Method of Rating and Loading Engines in Freight Service," brought out a large attendance at the meeting of Thursday evening, Jan. 17. This paper was published in abstract in the *Railroad Gazette* last week. It gives, perhaps, the best system of tonnage rating yet attempted, and the further development of methods as brought out by Mr. Tait's discussion, shows that the work has been undertaken with due regard to all difficulties involved. The author is in close touch with all of the elements that make for success or failure of road operations, and his records of lading since this system of rating has been operative, bear strong evidence of its practical efficiency. The discussion will be of greatest value when read in the published proceedings.

At this meeting 18 new members were elected, and the names of 29 applicants for membership were read and held for consideration.

The subject announced for the February meeting is "Japan and Its Transportation Facilities," the reading of the paper, by Mr. W. C. Tyler, to be accompanied by lantern slides.

The Air-Brake Association.

The Secretary of the Air-Brake Association announces the following subjects to be reported on at the next meeting and the members of the several committees:

"Unconnected Hose Hanging Free Versus Coupled Hose with a Well-Designed and Located Dummy Coupling."—H. H. Forney, Chairman; G. S. Hale, T. A. Hedendahl, Jno. Dickson, H. C. Frazer.

"Air Pump Exhaust for Passenger Train Heating."—Frank F. Coggin, Chairman; E. G. Desoe, Chas. S. Hall, T. A. Hedendahl.

"The Pressure-Retaining Valve: Its Value, Present General Condition and How It May Best Be Improved and Maintained."—G. R. Parker, Chairman; J. H. Stricklan, E. Kronberg, W. L. Clendenen, C. R. Ord.

"Terminal Test Plants; Why and Where Needed; Best Methods of Installation and Operation."—S. D. Hutchins, Chairman; W. T. Hamar, Otto Best, C. C. Farmer, W. P. Huntley, Jr.

"Revision of Progressive Form of Questions and Answers."—F. M. Nellis, Chairman; R. C. Augur, J. P. Kelly, C. C. Farmer and M. E. McKee.

Those having information on any of these subjects are asked to correspond with the Chairman of the committee having that topic in hand. The next meeting will be April 30 at Chicago.

American Institute of Mining Engineers.

The eightieth meeting of the Institute (being the thirty-first annual meeting) will be held at Richmond, Va., beginning Tuesday evening, Feb. 19, 1901. Communications concerning arrangements, excursions and hotel accommodations should be addressed to Mr. R. A. Dunlop, Secretary of the Chamber of Commerce, Richmond, Va., who is the Secretary of the local committee. The hotel headquarters, Bureau of Information, sessions, receptions, etc., will be at the Jefferson Hotel. The following programme is provisionally announced.

Feb. 19.—9 p. m.—Opening session in the Jefferson Hotel, when addresses of welcome, etc., will be delivered and President Douglas will give an illustrated lecture on the Paris Exposition of 1900. 10 p. m.—Reception to members and guests of the Institute in the Jefferson Hotel.

Feb. 20.—10 a. m.—Session. 2 p. m.—Visits to works, etc. 8 p. m.—Session. 10 p. m.—Concert in the Jefferson Hotel.

Feb. 21.—10 a. m.—Session; 2 p. m.—Visits to works, etc. 8 p. m.—Banquet at the Jefferson Hotel.

Feb. 22.—9 a. m.—Excursion by special train (Chesapeake & Ohio) to Charlotteville, University of Virginia, Monticello, the pyrites mines at Mineral, Va., etc.

Feb. 23.—Local visits and excursions (particulars in the programme of the local committee).

Engineering Association of the South.

The regular monthly meeting of the Association was held on the evening of Jan. 10 at Vanderbilt University. The death of Major Niles Meriwether, President of the Association, was announced, and Messrs. J. S. Walker and Hunter McDonald were appointed a committee to prepare a memorial. A communication from Mr. J. C. Trautwine, Jr., Secretary Journal of Association of Engineering Societies, was read. It was the unanimous opinion that the continuance of individual publications was preferable to uniting with the Journal of the Association of Engineering Societies. The first paper of the evening was a description of bridge pier and foundation work in Chemulpo, Korea, by W. H. Holmes, who has just recently returned from that country. The system of keeping records of rivers in that ancient country was briefly described. They extended back into the past for many centuries, and are said to be very accurate. Mr. Holmes stated that where an opportunity offered itself for a check the records were in every case sustained. The record for the river in question extended back 509 years, and explanation was made at the beginning of the records that the history of the river previous to that time had been consumed in a fire which had burned the house and all contents.

The second paper of the evening was presented by Mr. Julian W. Kendrick, City Engineer of Birmingham, Ala. It was a study of the sewerage problem now confronting the Birmingham district. The geographical features of the drainage area were described, the difficulties set forth to carrying out the various methods of sewerage, and finally a plan proposed.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. Joseph P. Rice has been appointed a member of the Missouri Railroad and Warehouse Commission to succeed the late Mr. Herrington.

—Mr. Lyle F. Bellinger, of Georgia, was nominated by the President on Jan. 16, after a competitive examination to be a civil engineer in the Navy to fill the vacancy created by Capt. Asserson's retirement.

—Mr. John Sever Tebbets died at Boston, Mass., Jan. 19, aged 43 years. He was employed by the Boston & Albany at East Boston for a time, then went to East Albany, N. Y., as Transfer Agent of the same road. In 1886 Mr. Tebbets became Assistant General Freight Agent of the Union Pacific and the following year General Passenger Agent. After leaving the Union Pacific Mr. Tebbets went to Arizona, where he was engaged in mining.

—Mr. T. A. Foque is the new Mechanical Superintendent of the Minneapolis, St. Paul & Sault Ste. Marie. Mr. Foque is 34 years old, and was graduated from the Massachusetts Institute of Technology in 1888. He entered the service of his present company the same year, and has held positions as draughtsman, Chief Draughtsman, Engineer of Tests and Assistant Mechanical Superintendent. He has just been elected President of the North-West Railway Club.

—Mr. Kyoichi Murakami, Engineer-in-Chief of the Hoshiu Railroad, of Japan, and Consulting Engineer of the Bantan and Nanao roads of that country, is now making a study of American methods of railroading. Mr. Murakami left Japan in May last, and has visited all the countries of middle Europe and the United Kingdom. He will leave New York Feb. 8 for Pittsburgh and Cleveland, returning to New York at the end of that month. After remaining here about one week, he will leave for San Francisco, from which place he will sail April 9 for Japan.

—Mr. W. H. Davisson, the General Roadmaster at Topeka, Kan., for the Chicago, Rock Island & Pacific, was born Dec. 11, 1862. His first work was with his present company as chainman, and he was on surveys and construction for two years. He was with the Union Pacific on location in Kansas, Nebraska and Colorado for the following 18 months, and then in 1888 returned to the Rock Island as Assistant Engineer, which position he held until 1898, when he was made Superintendent of the division between the Mississippi and Missouri rivers, the position he held at the time of his recent change.

—Capt. Francis T. Bowles, Naval Constructor, U. S. N., at present on duty at the Navy Yard, New York, was nominated by the President on Jan. 16 to be Chief of the Bureau of Construction and Repair, with the rank of Rear Admiral, to succeed Rear Admiral Philip Hichborn, who retires for age March 4. Capt. Bowles was appointed a Cadet Engineer from Massachusetts Sept. 15, 1875, and graduated from the Naval Academy in 1879. He was one of the two first Cadet Engineers selected to be sent to Greenwich, England, for an advanced course in naval architecture, and after his return he was appointed an Assistant Naval Constructor, his present commission dating from Oct. 15, 1888.

—Mr. William Blake, Engineer of Maintenance of Way for the Pennsylvania Company on the Western Division (Fort Wayne, Ind.), was born at Newburyport, Mass., Oct. 2, 1865. He took a course in civil engineering in the Massachusetts Institute of Technology, receiving his degree in 1887. He entered the service of the Pennsylvania Company the same year at Louisville, Ky., in the engineering corps of the Jeffersonville, Madisonville & Indianapolis, now the Louisville Division. He has served continuously with the Pennsylvania Company, and in 1889 was appointed Assistant Engineer of the Louisville Division; on July 1, 1898, Engineer of Maintenance of Way of the same division, and also engineer of the Louisville Bridge Company. He continued on the Louisville Division until his recent appointment.

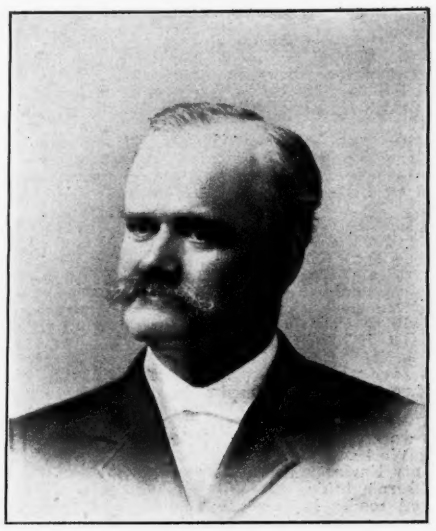
—Mr. S. W. Miller, the new Master Mechanic of the Southwest System of the Pennsylvania Company, was born Dec. 17, 1867. He was graduated from Stevens Institute of Technology in 1887, and entered the service of the Chicago, St. Louis & Pittsburgh at the Logansport shop as a special apprentice on Aug. 1 of the same year. From Dec. 1, 1889, until Feb. 1, 1896, he was employed in draughting, firing and special work on the Pittsburgh, Cincinnati, Chicago & St. Louis. Then until Aug. 1, 1899, he was assistant to the Superintendent of Motive Power of the same company. He was General Foreman of the Locomotive Department at the Dennison shop until April, 1900, and then until Jan. 1 last Assistant Master Mechanic at the Indianapolis shop.

—Mr. H. E. Hutchens has become Superintendent of the Memphis Division of the Southern at Memphis, Tenn. He was born in Butts County, Ga., and entered railroad service on Jan. 22, 1871, as telegraph operator for the Georgia R. R. He was on the Atlantic & Gulf until Feb. 1, 1876, when he entered the service of the Western Union. On Sept. 1, 1882, he took service with the Savannah, Florida & Western, and continued with that company until April 19, 1895, going from operator up to Master of Transportation. He was Master of Trains of the Plant System until March 1, 1896, and Yardmaster of the Central of Georgia until March 1, a year later. Then he became Assistant Superintendent of the Atlantic & Danville, and Superintendent, then Superintendent of the Norfolk Division of the Southern Railway on Sept. 1, 1899. His change to the Memphis Division took effect Jan. 1. He is also Superintendent of the Northern Alabama.

—Mr. J. A. Droege, Superintendent of the Pennsylvania and New York Division of the Lehigh Valley, was born at Deer Park, Md., Feb. 28, 1861. He entered the service of the Baltimore & Ohio on the Mountain Division, serving until March, 1884, as operator and train despatcher. He then went to the Chesapeake & Ohio as private secretary to the Superintendent of Transportation, where he continued until February of 1885, when he entered the service of the East Tennessee, Virginia & Georgia, and continued with the company until after its absorption into the Southern. In that company he served as Train Despatcher, Chief Train Despatcher, Yardmaster and Trainmaster at various points until Jan. 1, 1899, when he took service with the Lehigh Valley as Assistant Trainmaster of the Jersey City and Perth Amboy terminals. He was Trainmaster at Buffalo, N. Y., and then Trainmaster of the New York Division until Nov. 18, 1900, and is now Superintendent of the Pennsylvania and New York Division at Sayre, Pa.

—Mr. Charles Kimball Bannister died on Jan. 10 at Ogden, Utah, his home. Mr. Bannister was born in Cazenovia, N. Y., in 1847. His college education was at the Northwestern University, Evanston, Ill., of which his father was President. He went at once into civil engineering, and was a Division Engineer on the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul. Later he was a Division Engineer on the Union Pacific under Mr. Bogue, then Chief Engineer. Here he was entrusted with important work, which he carried out with signal ability. After he left the Union Pacific he had charge of the Pacific Short Line surveys to connect Sioux City with Ogden by the North Fork of the North Platte River and the South Pass. His home has been in Ogden since 1889, and there he became Chief Engineer and General Manager of the Union Light & Power Company, and built the great power plant in Ogden Canyon. At the time of his death he was Consulting Engineer of the Utah Light & Power Company, Chief Engineer of the Butte Power Company, Chief Engineer of the Weber Canyon Power Company and a director in the Salt Lake & Ogden Railroad. He was a man of sterling character, of solid old Presbyterian stock and greatly liked and respected in a wide circle of friends and business acquaintances. He became a Member of the American Society of Civil Engineers in 1893.

—The resignation of Mr. Everitte St. John, as Vice-President and General Manager of the Seaboard Air Line, recently noted in these columns, came as a surprise to his many friends. Mr. St. John is one of the best known railroad men in the country. Born in Connecticut, on Feb. 4, 1844, he entered railroad service at the age of 18 as a clerk in the general ticket office of the Quincy & Toledo, which was afterwards united with the Great Western Railroad of Illinois, now a part of the Wabash. He served as a clerk with the consolidated roads in the general ticket department at Springfield, Ill., till July 1, 1863, when he began his long career on the Chicago, Rock Island & Pacific, rising from a subordinate position in the general ticket department to the General Managership of the entire Rock Island system. In September, 1869, he was made General Ticket Agent, and in 1879 became General Ticket and Passenger Agent. In 1886 he became Assistant General Manager, and in September of the following year was appointed General Manager. On Jan. 1, 1895, Mr. St. John resigned his position on the Rock Island to become Vice-President of



the Seaboard Air Line, of which road he was the active managing officer. This position he has just resigned. While General Manager of the Rock Island, Mr. St. John was a leading spirit in the General Managers' Association of Chicago, and was its Chairman until his removal East. During his Chairmanship of that Association occurred the great "Debs" strike. He also held many other positions in Chicago, the mere mention of which will indicate the prominent place he occupied in the railroad life of the West. Among these were: Chairman of the executive committees of the Trans-Missouri Freight Association, the Western Railway Weighing Association and Inspection Bureau, the Chicago Car Service Association and the Live Stock Weighing Association; member of the Executive Committee of the Western Freight Association, and Chairman of the Railroad Finance Committee during the World's Fair of 1893. During his administration of the Seaboard Air Line that road has grown from a comparatively small institution to a large system, and has taken its place among the great railroads of the South. Mr. St. John is a man of uncommon force, physical and mental, and is by no means out of railroad work. In fact he is now engaged in important arbitrations.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—W. G. Nevin, General Manager of the lines west of Albuquerque, has been granted a six months' leave of absence, owing to ill health. A. G. Wells, General Superintendent, has been appointed Acting Manager during Mr. Nevin's absence.

Atlantic City (Reading).—M. F. D. Scanlan, Division Engineer at Camden, N. J., has resigned.

Baltimore & Lehigh.—J. S. Norris has been appointed General Manager, succeeding W. A. Moore, resigned. Effective Feb. 1.

Baltimore & Ohio.—G. W. Spencer, heretofore Trainmaster at Garrett, Ind., has been appointed Acting Superintendent of the Akron Division at Chicago Junction, Ohio, succeeding J. H. Glover.

Brainerd & Northern Minnesota.—G. D. Ball, heretofore Engineer Maintenance of Way, has been appointed Superintendent.

Canadian Pacific.—E. A. Williams has been appointed Superintendent of Rolling Stock, succeeding R. Atkinson, resigned.

E. Tiffin having resigned as General Freight Agent of the Ontario Division, the duties of that position will, until further notice, be assumed by the Assistant General Freight Agent, W. B. Lanigan, at Toronto, Ont., effective Jan. 21.

Chicago & Alton.—V. B. Lang, heretofore Master Mechanic, has been appointed Assistant Superintendent of Motive Power. C. J. Fellows has been appointed Superintendent of Car Service, succeeding J. E. May.

Chicago, Burlington & Quincy.—On Feb. 1, the Iowa

lines will be divided into three operating divisions, the first to be known as the Burlington Division, the second as the Ottumwa Division, and the third as the Creston Division. The Burlington Division will include the Carthage branch in Illinois; the Burlington terminals and main line from Burlington to Ottumwa and the Fort Madison branch from Batavia to Fort Madison. J. H. Duggan will be Superintendent of this division with headquarters at Burlington. C. E. Stewart is to be the Superintendent of the Ottumwa Division, and H. S. Stoors Superintendent of the Creston Division.

Chicago Junction (Union Stock Yards & Transit Co., of Chicago.)—The officers of this company are: President, J. A. Spoor; Vice-President, F. S. Winston; General Manager, A. G. Leonard; Secretary and Treasurer, C. D. Moyer, and General Superintendent, J. H. Ashby.

Cleveland, Cincinnati, Chicago & St. Louis.—G. H. Ingalls has been appointed Assistant General Freight Agent, succeeding R. P. Buchanan.

Colorado Midland.—Anthony Sneve, General Freight Agent, has resigned and the position of General Passenger Agent, as well as that of General Freight Agent, has been abolished and the duties will be assumed by the Traffic Manager. C. H. Speers has been appointed Assistant General Passenger Agent, effective Feb. 1.

Delaware, Lackawanna & Western.—A. G. Elvin, heretofore Master Mechanic of the Grand Trunk, has been appointed Master Mechanic of the D., L. & W., with headquarters at Scranton, Pa. J. M. Daly, Superintendent of Transportation at Scranton, Pa., has resigned. The various reports that Division Superintendent E. M. Rine has resigned are incorrect.

Denver & Rio Grande.—J. H. Schiff has been elected a Director, succeeding the late C. C. Beaman.

Findlay, Fort Wayne & Western.—T. M. Price has been appointed Master Mechanic, succeeding J. A. Hansgen, resigned.

Grand Trunk.—A. G. Elvin, Master Mechanic at Montreal, Que., has resigned.

Gulf & Ship Island.—The headquarters of E. M. Lake, Master Mechanic, are at Gulfport, Miss.

Intercolonial.—E. Tiffin, heretofore General Freight Agent of the Ontario & Quebec Division of the Canadian Pacific, has been appointed Traffic Manager of the Intercolonial, with headquarters at Moncton, N. B., effective Jan. 22.

Lake Charles & Rice Belt.—The officers of this company, referred to in the Construction column, are: President, C. A. Lowery; Vice-President, H. C. Drew; Secretary, C. A. McCoy; Treasurer, Leopold Kaufman; General Manager, A. V. Eastman.

Lehigh Valley.—J. T. Keith has been appointed Division Superintendent at Wilkesbarre, Pa., succeeding A. Mitchell. G. J. Gildroy, heretofore Trainmaster, succeeds Mr. Keith as Division Superintendent, at Hazleton, Pa.

Minneapolis, St. Paul & Sault Ste. Marie.—Theodore A. Foque, heretofore Assistant Mechanical Superintendent, has been appointed Mechanical Superintendent, succeeding E. A. Williams, resigned.

Missouri, Kansas & Texas.—F. A. Leland has been transferred as Assistant General Freight Agent, from Kansas City, Mo., to St. Louis, succeeding W. B. Groseclose, promoted. Mr. Leland is succeeded at Kansas City by J. L. West, heretofore Assistant General Freight Agent of the Missouri, Kansas & Texas of Texas at Houston, Texas.

New York & Harlem (N. Y. C. & H. R.)—At a meeting, on Jan. 17, E. V. W. Rossiter was elected Vice-President and a Director, succeeding C. C. Clarke, resigned. W. S. Crane succeeded Mr. Rossiter as Treasurer.

New York, New Haven & Hartford.—J. E. Martin, heretofore Superintendent of the Danbury Division, at Danbury, Conn., has been appointed Assistant Superintendent of the Hartford Division, Western District, with headquarters at Hartford, Conn., succeeding Edward Curtis, deceased. R. G. Curtis, heretofore Superintendent of the Northampton Division at New Haven, Conn., has been appointed Assistant Superintendent of the Air Line—Northampton, Division, W. D., at Westfield, Mass., effective Feb. 1.

Orange & Northwestern.—The officers of this company, referred to in the Construction column, are: President, G. B. Moore; Vice-President, A. Gilmer, and Secretary and Treasurer, D. Call.

Philadelphia & Reading.—George Mall has been appointed Road Foreman of Engines, with headquarters at Philadelphia, Pa.

Seaboard Air Line.—W. E. Renn has been appointed Superintendent of Car Service.

Southern.—George C. Smith, General Manager of the St. Louis-Louisville Division, has resigned, effective Feb. 1.

Southern Pacific.—R. C. Esson, Master Mechanic at Newark, Cal., has resigned and the duties of that position will be assumed by F. L. Bates, Master Mechanic, at San Francisco, Cal.

Tacoma Eastern.—The officers of this company are: President, Edw. Cookingham, Portland, Ore.; Vice-President, C. P. Masterson; General Manager, John Bagley; Auditor, L. R. Manning; and Chief Engineer, Henry Shaw, Tacoma, Wash. (See R. R. Construction Supplement, July 27, 1900.)

Tennessee Coal, Iron & R. R. Co.—At a meeting held Jan. 21, D. H. Bacon was elected Chairman.

Toledo, St. Louis & Western.—M. F. Bonzano, formerly General Manager of the Chattanooga Southern, has been appointed Chief Engineer of the T., St. L. & W., effective Jan. 15.

Wheeling & Lake Erie.—C. Hagan has been appointed Master Car Builder.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALPENA, GAYLORD & WESTERN.—Right of way is reported obtained for the entire line from Alpena, Mich., west across the State about 100 miles via Long Rapids, Hillman, Atlanta, Gaylord, Mancelona, Bellaire and Traverse City to Frankfort. Wm. M. Durand, of Ann Arbor, is President; Clarence M. Stephens, of Mount Clemens, Chief Engineer. (Nov. 16, 1900, p. 764.)

ATCHISON, TOPEKA & SANTA FE.—The San Francisco Board has granted right of way to the San Francisco & San Joaquin Valley from China Basin, along Illinois street to First avenue, and thence on Second street south to Fifteenth avenue, upon condition that the franchise shall not be sold to any railroad except the Atchison. (Dec. 7, 1900, p. 817.)

An officer writes that, contrary to report, the company proposes to do no work in the vicinity of Paoli, Ind. T. (Jan. 11, p. 33.)

BAY SHORE.—Messrs. James Burrill, B. B. Law and George Bingay, of Yarmouth, N. S., are applying to the Nova Scotia Legislature for an act of incorporation to build this electric street railroad from Yarmouth to Midland, N. S.

BELAIR & HAVRE DE GRACE.—Contracts are to be let soon for building in the early spring on this proposed electric line from Belair, Md., east about 15 miles to Havre de Grace. John H. Reckford, of Belair, Md., is President. (Dec. 28, 1900, p. 868.)

BRITISH COLUMBIA ROADS.—Messrs. McPhillips & Williams, of Vancouver, B. C., have given notice of application to the Legislature of British Columbia, for a railroad from the coal mines at Michell, by way of Michell Creek, thence on either side of the Elk and Kootenay Rivers, south to the International boundary; also from the same point north along the valley of the Elk River to a point on the main line of the Canadian Pacific; also from a point on the proposed line northeast by the North Kootenay Pass to Alberta to connect with the Crows Nest Pass Ry., or the British Columbia Southern.

Application is being made to the Dominion Government for a railroad from a point on the Canadian side of the International boundary line near Cascade City in the Osoyoos Division of Yale District, thence along the west side of the Kettle River to Carson, with branches not exceeding 25 miles long. J. B. McArthur and J. F. McCrae, of Rossland, B. C., solicitors.

BUFFALO, HAMBURG & AURORA.—An effort is being made to reorganize this company to complete its electric line from Buffalo, N. Y., south 38 miles via Hamburg to Cattaraugus. Some building has been done under the old company. U. L. Upson, 1095 Ellicott Square, Buffalo, is General Manager.

CALIFORNIA & NORTHERN.—This company has asked a franchise from the city of Eureka, Cal., for its proposed line from that city north about 90 miles to Crescent City. Charles Nelson, of San Francisco, Cal., is an incorporator. The company is represented by George D. Murray, attorney at Eureka. (Construction Supplement, July 27, 1900.)

CAMPBELL COUNTY COAL.—This company was incorporated in Tennessee, Jan. 12, with a capital stock of $25,000, to build a railroad from the Knoxville & Ohio to the LaFollette coal mines. Among the incorporators are A. L. Maxwell, J. F. Chumley and J. G. Johnson.

CANADIAN NORTHERN.—J. M. Smith, the Secretary, is applying to the Dominion Parliament for permission to build seven branch lines as follows:

From a point between Winnipeg and Marchand west via Carman and Belmont, to the western boundary of Manitoba.

From a point on the above line between Carman and the Red River, northwest to Portage la Prairie.

From a point west of Carman south through Manitoba to the International boundary.

From a point on the line between Carman and the Red River south to Emerson, thence east to a point on the main line between Vassar and Sprague.

From a point ten miles north of the company's line between Winnipeg and Ste. Anne south to the boundary.

From a point near the end of the 40 miles built by the Winnipeg Great Northern to the village of St. Laurent, thence to Oak Point on Lake Manitoba north to Grand Rapids on the Saskatchewan River.

From a point between Oakland and Macdonald west to Brandon, thence to the boundary near Township 15 or 16, thence northwest to a point on the company's line northwest of Battleford.

CANADIAN PACIFIC.—The company proposes to complete its extension from Lardo, B. C., to Duncan City, 16 miles. It was graded some time ago. (Dec. 1, 1899, p. 835.)

CENTRAL RAPID TRANSIT.—This company has been incorporated in Pennsylvania, to build electric lines from Scranton to Green Ridge, Providence, Dunmore and other suburban towns. John H. Brooks, of Scranton, is Secretary. W. W. Watson, President of the Providence & Abington Turnpike & Plank Road Co., is an incorporator.

CHESTERFIELD & LANCASTER.—Several miles of track are reported laid on this line between Cheraw, S. C., and Lancaster, 50 miles. G. J. Redfearn, of Chesterfield, S. C., is President. (Oct. 5, 1900, p. 662.)

CHICAGO & NORTHWESTERN.—D. D. Streeter, Chicago, is reported to have the contract for the branch from Pelican, Wis., northeast 18 miles to Lake Crandon, under the charter of the Crandon R. R. (Sept. 21, 1900, p. 628.)

CHICAGO, BURLINGTON & QUINCY.—Surveys have been made, according to report, just west of Colona, Ill., for a cut-off 2¾ miles long, to shorten the line one-half mile and do away with grade crossings.

CHICAGO, COVINGTON & SOUTHWESTERN.—Surveys were completed last week, according to report, for building this proposed line from Chicago, Ill., southeast about 160 miles via Covington, Ind., to Terre Haute. Bayard Taylor is Secretary, and Chas. N. Roberts, Engineer, both of Chicago.

CHICAGO, ROCK ISLAND & PACIFIC.—The W. R. Stubbs Contracting Co., of Lawrence, Kan., wants sub-contractors on about 70 miles of the Chicago, Rock Island & Mexican extension toward the El Paso & Northeastern, between Twist, Tex., and the Canadian River. See also our advertising columns. (Jan. 4, p. 16.)

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—The Superior Court at Cincinnati, Ohio, has decided that the Cincinnati Southern trustees cannot issue the proposed $2,500,000 bonds for terminal improvements without a vote of the city. (Jan. 11, p. 34.)

CLARION & SUMMERVILLE.—Surveys are in progress and contracts are to be let in about 30 days for this proposed line from Clarion, Pa., to Summerville, on the Pennsylvania R. R., 16 miles. There will be one bridge of 250-ft. span. (Official.) J. C. Whitla is President, and R. G. Yingling Vice-President, both of 314 Fourth avenue, Pittsburgh. (Jan. 11, p. 34.)

COLUMBIA & MONTOUR ELECTRIC.—This company has let a contract to M. F. D. Scanlon & Co., Harrisburg, Pa., to build its proposed electric line of 19 miles from Bloomsburg, Pa., connecting Grovania, Catawissa and other cities. B. F. Myers, of Harrisburg, is President.

DAWSON ELECTRIC.—The City Council of Dawson, Alaska, is reported to have granted this company a franchise for an electric line out of the city, to run to Coal Creek, about 20 miles, with branches to Bonanza and Hunter Creeks. The Alaska Exploration Co. is said to be interested.

DETROIT, PONTIAC, LAPEER, CARO & BAY CITY.—This company was organized at Detroit, Mich., Jan. 18, to build an electric railroad from Detroit northwest through the cities named to Bay City. Most of the right of way is reported secured. D. R. Currey is President and General Manager, and W. B. Hawkins Vice-President.

EASTERN NEBRASKA & GULF.—Both Houses of Congress have passed a bill extending the time of the franchises of this company. The road is projected from Sioux City, Iowa, south through Nebraska, 97 miles to Omaha. W. C. McNamara, of Sioux City, Iowa, is President. (Construction Supplement, July 27, 1900.)

EAST LIVERPOOL & YOUNGSTOWN.—This company has been incorporated in Ohio, with a capital stock of $15,000, to build a railroad connecting the two cities named.

GASPE & WESTERN.—Application is being made to the Dominion Parliament to incorporate this company to build a railroad from Fraserville, on the Intercolonial, in the county of Temiscouta, Que., to a point at Gaspe Basin, passing through the counties of Temiscouta, Bonaventura and Gaspe; also to buy and operate the Baie des Chaleurs and the Atlantic & Lake Superior.

GRAND TRUNK.—Building is reported begun on the bridge over Mechanics Falls, Me., for double tracking the line from Portland toward Montreal.

GREAT FALLS & OLD DOMINION.—Building is begun on this electric line from Rosslyn, Va., end of the Aqueduct bridge at Washington, D. C., via Cherrydale, Hillsdale, Lincolnville, Langley and Prospect Hill to the Great Falls of the Potomac, 14 miles. Most of the right of way is secured. Joseph S. Miller, of Washington, D. C., is President. (Construction Supplement, July 27, 1900.)

HARRISBURG & SOUTHERN.—Building was begun near Harrisburg, Ill., Jan. 14, on this line, from Galatia, Ohio, south 35 miles to the Ohio River, with a branch from Harrisburg to Marion, 25 miles. Construction Supplement, July 27, 1900.)

JAMESTOWN MANUFACTURERS' TERMINAL.—An application is before the New York State Railroad Commission to build this steam road, 2½ miles long, at Jamestown. Wm. Endress and Samuel Briggs, of Jamestown, N. Y., are directors. (Construction Supplement, July 27, 1900.)

KANSAS CITY, FORT SCOTT & MEMPHIS.—The company is reported to have decided to place 75-lb. rails on about 50 miles of its line between Memphis, Tenn., and Hoxie, Ark.; also upon 30 miles between Memphis and Tupelo, Miss.

KANSAS CITY, PARKVILLE & ST. JOSEPH ELECTRIC.—This company was recently incorporated in Missouri by the banking firm of Denison, Prior & Co., of Cleveland, Ohio, and Boston, to build an electric railroad from Kansas City northwest via Parkville, Waldron, Farley, Beaverly, Weston, Dye and DeKalb to St. Joseph. During the past week franchises have been obtained from the cities of Parkville and Weston, and the company also has about 30 miles of private right of way in Platte County. The road of the Kansas City & St. Joseph Electric, which proposes to build between the two cities, is by another route. J. L. Brown & Co., 554 Gibraltar Bldg., Kansas City, Mo., are interested. (Official.)

KANSAS CITY SOUTHERN.—Building is in progress on a new line between Texarkana, Tex., and the Red River.

KINGSTON & CENTRAL MISSISSIPPI.—This road, which has been completed from Sharon Church, Miss., to Seminary Church, eight miles, is building from Kingston to Bay Spring, Miss., 30 miles. F. W. Pettibone, of Laurel, Miss., is General Manager.

LAKE CHARLES & RICE BELT.—This company was incorporated in Louisiana, Jan. 21, with a capital stock of about $1,000,000, to build a railroad from Lake Charles east about 200 miles via Abbeville to New Orleans. Preliminary surveys are reported completed to Abbeville. The officers are given under Elections and Appointments.

LANCASTER, MECHANICSBURG & NEW HOLLAND.—Application is to be made for a charter under the new steam railroad act, for this proposed electric line in Pennsylvania, from Mechanicsburg east about 20 miles to New Holland. There is some difficulty, it is stated, as to right of way.

LOUISVILLE, ANCHORAGE & PEWEE VALLEY.—This company has been incorporated in Kentucky, to build a railroad from Louisville northeast about 20 miles via Anchorage to Pewee Valley. The right of way is reported obtained and surveys are in progress. Percy Moore, of Louisville, is interested.

LOUISVILLE & NASHVILLE.—Surveys are reported begun for a branch from Brush Creek, Ky., up Brush Creek Valley to coal fields in Rock Castle County.

MISCELLANEOUS COMPANIES.—The Reed-Haseltine Construction Co. was incorporated in Ohio, Jan. 14, with a capital stock of $10,000, to build railroads, etc. V. S. Reed and W. C. Haseltine, of Cleveland, Ohio, are incorporators.

MISSISSIPPI, EAU CLAIRE & NORTHERN.—This company has been organized by people of Eau Claire, Wis., to build a railroad from that city north up the east side of the Mississippi to Lake Superior. The plan is, according to report, to buy the Minneapolis, St. Paul & Ashland for a portion of the route. The distance from Eau Claire to Ashland is about 170 miles. David Kirk, of Eau Claire, is Chief Engineer. Other Eau Claire people interested are Byron Buffington and Thomas S. Frawley.

MISSISSIPPI ROADS.—The Hoyt & Woodin Mfg. Co., of Minter City, Miss., writes that demand has been made for bids on grading and surfacing for a standard gage line from the company's sawmill to a point near Minter City, about 4⅛ miles. The letting will be postponed until some time in early February. There will be no iron or steel bridges, but about 400 ft. of low trestle to build. John Sherman Hoyt, 47 Cedar street, New York, is President; W. H. Woodin, Berwick, Pa., Vice-President, and W. H. Martz, Minter City, Miss., General Manager. (Jan. 11, p. 34.)

MISSOURI, KANSAS & TEXAS.—An extension is reported proposed from Simpson, Ind. T., to the Wilburton coal fields, about 25 miles.

MOUNTAIN VALLEY & BAKERSFIELD.—Application has been made to the city of Bakersfield for right of way for the proposed line in Kern County from Bakersfield northwest. C. A. Lee and J. L. Carson are incorporators. The principal office is Bakersfield, Cal. (Nov. 17, 1900, p. 764.)

NEVADA-CALIFORNIA-OREGON.—The company proposes to build an extension from Termo, Cal., north into Oregon.

NEW BRUNSWICK COAL & RAILWAY.—Application is to be made in New Brunswick to incorporate this company to build from Grand Lake east to Gibson, York County, on the Canada Eastern.

NORTHERN OHIO TRACTION.—This company, according to report, will build an extension from Akron, Ohio, south about 20 miles to Canton. A movement is instituted, according to report, to increase the capital stock to $1,000,000 to provide for building. The central office is at Akron.

NORTHERN PACIFIC.—Surveys are in progress, presumably by this company for a railroad from Scappoose, Ore., about 20 miles north of Portland, on the N. P., to run west into the Nehalem Valley.

NORTHWEST.—P. H. Flynn, of Huntington, Idaho, General Manager of this company, is making arrangements to resume work soon. It is stated that the road is to be completed from Nagle, Ore., to the mouth of Powder River, 33 miles. Isaac E. Blake, 11 Broadway, New York, is President. (Construction Supplement, July 27, 1900.)

NOVA SCOTIA CENTRAL.—Application is being made to the Dominion Parliament to incorporate this company to build a railroad from New Glasgow, N. S., to Country Harbor, on the south shore of the province, running through the counties of Pictori and Guysboro; with a branch line from the head of Country Harbor to some point at Chedabucto Bay near the town of Guysboro.

OBION & TIPTONVILLE.—Surveys are to be begun at once, according to report, for this electric line from Obion, Tenn., to run northwest about 25 miles via Glass, Elbridge and Hornbeak to Tiptonville, on the Ohio River. Major J. C. Harris, Tiptonville, is President.

OHIO, TENNESSEE & CAROLINA.—This company was incorporated in Tennessee, Jan. 12, with a capital stock of $25,000, to build a railroad from a point near Jellico, near the Kentucky line, south to Knoxville, and thence to a point on the North Carolina State line at the crossing of the Little Tennessee. Among the incorporators are: Wm. Kirkley, W. B. Crenshaw and J. C. J. Williams.

OMAHA NORTHERN.—The U. S. Senate has passed the House bill extending the franchise of this company for three years through the Omaha and Winnebago Indian reservations. The line is projected from Sioux City, Iowa, south about 92 miles to Omaha, Neb. A. S. Churchill, of Omaha, is President. (Construction Supplement, July 27, 1900.)

ONTARIO ROADS.—A company has been formed to build a railroad from Galeta, on the Canada Atlantic, north across the Ontario River to a point on the Pontiac & Pacific Junction between the villages of Quyon and Shawville; also to extend the road to the town of Arnprior.

ORANGE & NORTHWESTERN.—This company was incorporated in Texas, Jan. 15, with a capital stock of $200,000, to build a railroad from Orange, Tex., northwest about 30 miles to a point on the Gulf, Beaumont & Kansas City at or near Buena, Jasper County. The incorporators are: G. Bedell Moore, San Antonio, Tex.; Alexander Gilmer, G. W. Bancroft, A. J. Bancroft, C. Miller, A. McKinnon, J. A. Ochiltree, A. T. Chevault, W. W. Reid and W. H. Stark, all of Orange. The officers are given under Elections and Appointments.

OREGON ROADS.—The New York & Oregon Coal & Timber Co., in which General James Negley, 135 Broadway, New York, is interested, has been organized to develop the Nehalem Valley. The company is trying to buy 50,000 acres of timber land, of which about 40,000 acres is now obtained. If the entire amount is bought, a railroad will be built from Portland, Ore., west about 75 miles through the valley to the mouth of the Nehalem River. It is the intention to begin surveys and build the road as soon as the land is acquired. (Jan. 4, p. 16.)

Citizens of Gilliam County have organized to build a line from Condon, Ore., north about 50 miles through Clem and Olex to Arlington, or some other point on the Oregon Railroad & Navigation. Among those interested are S. B. Barker, of Condon; E. T. Snell, Olex; Fred. Tobey, Arlington, and C. A. Danneman, Clem.

PENNSYLVANIA.—The new work noted last week (p. 52), for which bids will be received at the Chief Engineer's office up to 9 a. m., Jan. 28, in detail, is as follows:

(1) Change of line at three points between Florin and Rheems Stations on Philadelphia Division, Pennsylvania Railroad, requiring about 30,000 cu. yds. excavation.

Plans can be seen at office of W. B. Prichett, Assistant Engineer, at Lancaster, Pa.

(2) Additional tracks between Juniata Bridge and Aqueduct Station on Middle Division, requiring about 100,000 cu. yds. embankment and 8,000 cu. yds. rip-rap.

Plans can be seen at office of George Nauman, Assistant Engineer, at Rockville, Pa.

(3) Change of line and additional tracks in Lewistown Narrows on Middle Division, as follows: Section 1. MI Tower to FX Tower, requiring about 210,000 cu. yds. excavation. Section 2. FX Tower to end of line, requiring about 250,000 cu. yds. excavation and 15,000 cu. yds. rip-rap.

Plans can be seen at office of J. F. Murray, Assistant Engineer, at Mifflin, Pa.

(4) Additional tracks between Mount Union and Mill Creek on Middle Division, requiring about 600,000 cu. yds. excavation, 15,000 cu. yds. arch bridge masonry, and 2,000 cu. yds. rubble masonry.

(5) Additional tracks between Spruce Creek and Union Furnace on Middle Division, requiring about 52,000 cu. yds. excavation, 2,000 cu. yds. rip-rap, and 900 cu. yds. bridge masonry.

Plans for both (4) and (5) can be seen at office of W. K. Martin, Assistant Engineer, at Huntingdon, Pa.

(6) Four-track road-bed between Larimer and Stewart on Pittsburgh Division, as follows: Section 1. From Mile Post 333 to Mile Post 334, requiring about 170,000 cu. yds. excavation and 1,600 cu. yds. bridge masonry. Section 2. From Mile Post 334 to Mile Post 336, requiring about 120,000 cu. yds. excavation and 3,500 cu. yds. bridge masonry.

Plans can be seen at office of Geo. C. Clarke, Assistant Engineer, at Pittsburg, Pa.

PITTSBURGH & FAIRMOUNT SHORT LINE.—Grading is in progress on this new line from Fairmount, W. Va., northwest about 18 miles to Blacksville. Thomas W. Fleming, of Fairmount, W. Va., is President. (Construction Supplement, July 27, 1900.)

POINT COMFORT BEACH.—This company has been organized in Virginia to build an electric railroad between Newport News and Old Point, via Hampton and Phoebus.

PORT ARTHUR, HOUSTON & WESTERN.—Surveys have been completed for 50 miles, and the remaining 35 will be surveyed before the end of this month, according to report, for this line from Port Arthur, Tex., west to Houston. Wm. McDaniel, of Port Arthur, Tex., is President. (Dec. 14, 1900, p. 834.)

RAPID TRANSIT.—Macdonell, Boland & Thompson, of Toronto, are applying for an act to incorporate this company to build a system of elevated and surface railroad in Toronto and adjoining municipalities.

RICHMOND & PETERSBURG.—This company has been incorporated with a capital stock of $1,000,000, to build an electric railroad from Richmond, Va., south 22 miles to Petersburg. Wm. Christy and J. R. Nutt, of Akron, Ohio, are interested.

SACRAMENTO & SAN JOAQUIN VALLEY.—The city of Stockton has granted right of way in that city for this proposed line from Stockton, Cal., north about 50 miles via Freeport to Sacramento. John Cross, of Los Angeles, Cal., is President and Chief Engineer. (Construction Supplement, July 27, 1900.)

SLATE RUN.—This company proposes to build an extension from Manor Fork, Pa., to Camp Francis, 12 miles.

SOUTH CAROLINA ROADS.—The Atlantic Coast Lumber Co., of Georgetown, is reported completing surveys for a railraod between Georgetown and Marion, S. C.

SOUTHERN INDIANA.—An officer writers that the report that his company will build a branch from a point near Indian Springs, Ind., to Louisville, is an error. No such extension is contemplated. (Jan. 18, p. 52.)

He also denies the report that the company has under consideration an extension to Chicago.

SOUTHERN PACIFIC.—Surveys are reported in progress near Alameda, Cal., for putting in a third rail standard gage on some of the South Pacific Coast lines near that city.

SYRACUSE & SOUTH BAY.—There was a hearing before the New York State Commissioners, Jan. 17, to grant permission to this company to build an electric road from Syracuse north 20 miles to South Bay, on Oneida Lake. Wm. G. Tracy represented the company.

TENNESSEE & NORTH CAROLINA.—Building is in progress for 12 miles on this proposed line from Newport, Tenn., southeast 18 miles via Pigeon River to Big Creek, N. C. The work is being done by the company. J. J. Holloway, of Wheeling, W. Va., is President; H. T. Wilson, Clarksburg, W. Va., General Superintendent, and W. C. Fawcett, Newport, Tenn., Chief Engineer. (Oct. 5, 1900, p. 662.)

TENNESSEE NORTHERN.—Arrangements are reported completed for extending this line from Rex, Tenn., north east about 30 miles to Middlesboro, Ky. (Construction Supplement, July 27, 1900.)

TEXAS & LOUISIANA.—Building is completed from Lufkin, Tex., to Donovan, and the company is building from Donovan to the Angelina River. (Aug. 3, 1900, p. 532.)

TEXAS ROADS.—The Central Coal & Coke Co., of Texarkana, Ark., is reported to have let a contract for building a railroad from Lufkin, Tex., east 18 miles to the company's new sawmill. The road is to be completed July 1.

Surveys are being made, according to report, for a line from Brownsville, Tex., to Alice, 134 miles, to connect with the San Antonio & Aransas Pass. J. B. Wells, of Brownsville, is interested.

The Kansas City Coal & Coke Co. is reported to have begun work on a line from Lufkin, Tex., to a connection with the International & Great Northern.

UNION PACIFIC.—An officer writes that nothing is yet decided as to improvements on the Kansas Division. (Jan. 11, p. 34.)

UNION RAILROAD & TRANSPORTATION.—This company has been incorporated in Oregon, with a capital stock of $600,000, to build a railroad from Union along the St. Catherine Creek Pass to the eastern part of Union County. The principal business address is Union, Ore. E. W. Davis, W. H. Erwin and F. E. Foster are incorporators.

WHITEHALL & GRANVILLE.—A petition is before the New York State Railroad Commission to grant this company the right of way for its proposed electric line from Whitehall, N. Y., southeast to West Pawlet, Vt., with a branch from Granville to Lake St. Catherine and South Poultney, Vt., of which 20.14 miles is in New York and 8.41 miles in Vermont, besides 5.7 miles of spurs and sidings. Chas. I. Baker, 10 Hall Bldg., Troy, N. Y., is interested. (Construction Supplement, July 27, 1900.)

WILD GOOSE.—This company, which built a line from Nome, Alaska, to Anvil, last year, proposes to build from Dry Creek to Lane City.

WISCONSIN CENTRAL.—New surveys are being made, according to report, for a cut-off from Greenwood, Wis., northwest about 50 miles to Chippewa Falls.

YORK SOUTHERN.—In connection with the proposed taking over of this road by the Baltimore & Lehigh (see Railroad News column) it is stated that it is proposed to build an extension of the Y. S., from Red Lyon, Pa., north about 15 miles to Columbia, to connect with the Reading, which it is understood will take over the two lines. This will require a bridge across the Susquehanna.

GENERAL RAILROAD NEWS.

BESSEMER & LAKE ERIE.—See Pittsburgh, Bessemer & Lake Erie.

BUFFALO, ROCHESTER & PITTSBURGH.—The company, on Tuesday, Jan. 15, declared its first dividend on the common stock, namely, 2 per cent., payable Feb. 15.

CHICAGO, BURLINGTON & QUINCY.—The directors, on Jan. 16, voted to offer 10 per cent. of new stock at par, to stockholders of record on Feb. 7. This will increase the outstanding capital stock to about $109,000,000. The proceeds will be used as follows: To redeem sinking fund 5s, due Oct. 1, 1901, $2.315,000; to reduce grades and straighten curves on the main line in Iowa, about $2,000,000; to build the Big Horn Basin from Toluca to Cody, Wyo., 120 miles, about $2,000,000, including $500,000 already expended; for equipment, real estate, etc., about $3,685,000. The right to subscribe will expire at 3 p. m., March 1. Payments may be made of 20 per cent. March 11, 50 per cent. May 31, and 30 per cent. Aug. 1, with interest on the deferred payments at 6 per cent. from their average date June 3 to June 15.

CHICAGO CITY.—At the annual meeting of the stockholders, on Jan. 15, in Chicago, it was decided to increase the capital stock by $5,000,000, the proceeds to be used in part to repay the company's $4,619,500 4½ per cent. bonds, which mature July 1.

CINCINNATI, PORTSMOUTH & VIRGINIA.—The Pennsylvania interests, which recently obtained control of this line, have made arrangements to transfer the property to the Norfolk & Western, in which the Pennsylvania is a large stockholder. This will give the N. & W. terminals at Cincinnati and close connections with other railroads.

DULUTH, MISSABE & NORTHERN.—Seventy-five first consolidated mortgage bonds of Jan. 1, 1893, have been drawn for payment at the Central Trust Co., New York, at 105 and interest, interest to cease Jan. 29. (Jan. 26, 1900, p. 64.)

ERIE.—A circular has been addressed to stockholders announcing the purchase of the Pennsylvania Coal Co., and the intention to issue in connection therewith $5,000,000 first preferred stock, and $32,000,000 50-year 4 per cent. collateral trust bonds, to be secured by deed of trust, and pledge of stock of the Erie & Wyoming Valley, the Delaware Valley & Kingston and the Pennsylvania Coal Co.; also 51 per cent. of the stock of the New York, Susquehanna & Western. The bonds are limited to $36,000,000, of which at least $4,000,000 are to be reserved for betterments. (Jan. 4, p. 16.)

INDIANA, ILLINOIS & IOWA.—Frank P. Hawkins, of Highland Park, Ill., has filed a petition in the Starke County (Ind.) Circuit Court for the appointment of a receiver for this company, to satisfy a claim for grading done by Mr. Hawkins on the old Plymouth, Kankakee & Pacific, now a part of the Indiana, Illinois & Iowa, for which he received bonds.

KANSAS CITY, FORT SCOTT & MEMPHIS.—The stockholders, on March 13, will vote on propositions to buy the Kansas City, Clinton & Springfield and the Current River railroads. The roads are controlled by the K. C., F. S. & M.

LAKE STREET ELEVATED (CHICAGO).—Holders of trust certificates of the Illinois Trust & Savings Bank, Chicago, for stock of the company, are notified that the bank has received written notice from owners of more than 80 per cent. of the certificates, that the agreement of June 10, 1896, has been terminated, and preparations are being made to issue stock certificates. (Jan. 19, 1900, p. 48.)

NEW ORLEANS & WESTERN.—This property is to be again offered for sale on March 9, the upset price being about $800,000, including charges. Several other attempts have been made to sell the property. (Nov. 23, 1900, p. 784.)

NEW YORK, CHICAGO & ST. LOUIS.—The company, on Jan. 17, declared a first dividend of 2 per cent. on the second preferred stock.

NEW YORK, NEW HAVEN & HARTFORD.—According to a Hartford despatch, the People's Tramway Co., controlled by the N. Y., N. H. & H., has bought the Webster & Worcester electric street line, which gives it the ownership of the entire route from Danielson to Worcester, nearly 40 miles.

NORTHERN PACIFIC TERMINAL.—Twenty-two bonds have been drawn for redemption by the Farmers' Loan & Trust Co., as trustee, at 110 and accrued interest, on Feb. 9, on which date interest will cease. (July 20, 1900, p. 522.)

PECOS VALLEY & NORTHEASTERN.—The Atchison is offering $15 per share for the preferred, and $10 per share for the common stock of the P. V. & N. E., to the minority stockholders. The Atchison has already obtained control of the majority stock. (Jan. 4, p. 16.)

PENNSYLVANIA.—A bill has passed the Pennsylvania Senate to permit this company to increase its capital stock by $100,000,000. (Jan. 11, p. 34.)

PITTSBURGH, BESSEMER & LAKE ERIE.—The minority stockholders, in Pittsburgh, on Jan. 16, agreed to lease the road to the new Bessemer & Lake Erie, a company that has been recently incorporated as a subsidiary company to the Carnegie Steel Co. The lease is for 999 years and the minority common stock is guaranteed 3 per cent. per annum. Possession is to be given, it is said, on April 1. The Carnegie Steel Co. owns a majority of the stock. (Dec. 21, 1900, p. 852.)

PLANT SYSTEM.—According to a press despatch from Savannah, Ga., the directors of practically all the roads in the Plant System have agreed upon a plan of reorganization by consolidation, to be carried into effect in April next. The lines so agreeing are: The Savannah, Florida & Western, the Charleston & Savannah, the Brunswick & Western, the St. Johns River, the Florida Southern, the South Florida, the Silver Spring, Ocala & Gulf, the Green Pond, Walterboro & Branchville, the Abbeville Southern and the Southwestern Alabama.

SALEM.—Judge Ricks, in the U. S. Circuit Court, at Salem, Ohio, has ordered the sale of this property, the upset price being $125,000. It runs from Salem, Ohio, to Washingtonville, 6.92 miles. It was built under a special law of the Ohio Legislature authorizing the city of Salem to bond itself for $125,000. The sale was ordered as a result of action brought by the Morton Trust Co., New York.

SHORE LINE OF NEW BRUNSWICK.—This line, running from St. John, N. B., to St. Stephen, 82½ miles, is to be sold at foreclosure at St. Stephen, on Jan. 28.

SOUTHERN.—J. P. Morgan & Co., New York, are offering $10,750,000 of St. Louis Division first mortgage 4 per cent. 50-year gold bonds at 97½ and interest. These bonds are issued on the property formerly belonging to the Louisville, Evansville & St. Louis Consolidated.

TERRE HAUTE & INDIANAPOLIS.—Representatives of the Pennsylvania R. R. are reported as offering to buy the stock of holders of this company.

WABASH.—Simon Borg & Co., New York, have bought $3,000,000 of 4 per cent. 40-year bonds, and $3,000,000 of new equipment 5 per cent. 20-year car trust bonds.

WESTERN MARYLAND.—Edward Lauterbach, of New York, representing the Manhattan Trust Co. syndicate, has made a new offer to buy this property from the city of Baltimore. The price is reported at $6,000,000.

YORK SOUTHERN.—A call has been issued for a special meeting of the stockholders, to be held at York, Md., on Feb. 2, to consider an agreement to consolidate with the Baltimore & Lehigh. The B. & L., as recently noted, has an offer to sell its shares at $70 per share (B. & L., Dec. 21, 1900, p. 852.)